CR 25.0

Reference manual

Point of > Knowledge

AGFA

- *The device must only be operated according to its specifications and its intended use. Any operation not corresponding to the specifications or intended use may result in hazards, which in turn may lead to serious injuries or fatal accidents (for example electric shocks). AGFA positively will not assume any liability in these cases.*
- *The device must only be installed and put into operation under the specified conditions.*

For more information on Agfa products and Agfa HealthCare products, please visit www.agfa.com, your Point of Knowledge.

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Chapter 1

Introducing the CR 25.0

This chapter draws attention to important safety precautions and introduces the CR 25.0.

- ❑ CR 25.0 intended use
- ❑ CR 25.0 features
- ❑ Safety precautions
- ❑ Safety compliance
- ❑ Operating modes
- ❑ Configurations
- ❑ The user interface
- ❑ Switching on the CR 25.0
- ❑ Switching off the CR 25.0

CR 25.0 intended use

This device must only be used to scan exposed X-ray cassettes, containing an erasable image plate (IP). This device is part of a system, consisting of
X-ray cassettes with erasable phosphor image plates, an identification station for the cassettes and a workstation where the resulting digital image information is further processed and routed. This device is intended to be operated in a radiological environment by qualified staff.

CR 25.0 features

The CR 25.0 is a Digitizer for image plates retaining latent X-ray images. It has been developed by Agfa.

- The CR 25.0 accepts one cassette containing one image plate at a time. The CR 25.0:
  - takes the cassette containing the image plate from the cassette slot;
  - removes the image plate from the cassette;
  - scans the image plate;
  - converts the information of the latent image to digital data;
  - transmits the image data to the preview station;
  - erases the image plate and re-inserts it into the cassette;
  - gives the cassette ID data the status ‘erased’;
  - returns the cassette;
  - transmits the digital image data to an image processing station (‘destination’).

- The CR 25.0 allows assigning the status ‘emergency’ to an image.
  The Digitizer gives an image priority to be sent to the image processing station if the “Emergency key” was pressed before inserting an unidentified cassette.

- The CR 25.0 allows re-erasing an image plate before re-using it. In specific cases, this is necessary to prevent ghost images caused by previous exposures or stray radiation from interfering with the image of interest.

- If the CR 25.0 is dedicated to one ID Station, additional features are available:
  - quickly identifying cassettes without the need for an ID Tablet;
  - reading the identification data of a cassette;
  - initializing a cassette, i.e. changing the image plate type.

Safety precautions

General safety instructions

- For software and other technical platforms, and/or if valid in combination with any consumable, which constitute, after installation, a system for the interpretation of medical image data by trained and qualified professionals: it is the user's responsibility to ensure that image quality, display quality, environmental lighting and other possible distractions are consistent with the clinical application.
- Make sure that the CR 25.0 is constantly monitored in order to avoid inappropriate handling, especially by children.
- Only trained service personnel must make repairs. Only authorized service personnel must make changes to the CR 25.0.
- If there is any visible damage to the machine casing, do not start nor use the CR 25.0.
- If you want to connect the CR 25.0 with other devices, components or assemblies and if the technical data do not allow determining whether the combination with these devices, components or assemblies involves hazards, you must consult the respective manufacturers to avoid danger for operating personnel or the environment.
- Do not override or disconnect the integrated safety features.
- As is the case for all technical devices, the CR 25.0 must be operated, cared for and serviced correctly.
- If you don't operate the CR 25.0 correctly or if you don't have it serviced correctly, Agfa-Gevaert is not liable for resulting disturbances, damages or injuries.
- When installing the CR 25.0, care must be taken to ensure that there is either a mains plug or an all-cable disconnecting device in the internal installation fitted near the CR 25.0 and that it is easily accessible.
- If you notice conspicuous noise or smoke, disconnect the CR 25.0 immediately.
- Check that the mains voltage is within the specified range of the self adapting power supply of the machine.

Markings and labels

Always take into account the markings and labels provided on the inside and outside of the machine. A brief overview of these markings and labels and their meaning is given below.

	Safety warning, indicating that the CR 25.0 manuals should be consulted before making any connections to other equipment. The use of accessory equipment not complying with the equivalent safety requirements of this Digitizer may lead to a reduced level of safety of the resulting system. Consideration relating to the choice of accessory equipment shall include: • Use of the accessory equipment in the patient vicinity, • Evidence that the safety certification of the accessory equipment has been performed in accordance with the appropriate IEC 601-1 and IEC 601-1-1 harmonized national standard. In addition all configurations must comply with the medical electrical systems standard IEC 601-1-1. The party that makes the connections acts as system configurator and is responsible for complying with the systems standard. If required contact your local service organization.
	In order to reduce the risk of electric shock, do not remove any covers.
	Caution hot: Keep hands clear from the erasure unit.
	Type B equipment: Indicates that the CR 25.0 complies with the limits for type B equipment.
	Supplementary protective earth connector: Provides a connection between the CR 25.0 and the potential equalization busbar of the electrical system as found in medical environments. This plug should never be unplugged before the power is turned off and the power plug has been removed.
	Intergrounding connector: Provides a connection between the Digitizer and other equipment which might exhibit minor ground potential differences. These differences may degrade the quality of communication between different equipment. Never remove connections to this terminal.
	Protective earth (ground): Provides a connection between the Digitizer and the protective earth of the mains. Do not remove this connection, because this will have a negative influence on the leakage current.

	Power On
	Power Off Note that the power cord has to be disconnected from the wall outlet in order to disconnect the unit entirely from the mains.
	Precautions for use in USA only: Make sure that the circuit is single-phase center-tapped, if the Digitizer is connected to a 240 V/60 Hz source instead of a 120 V/60 Hz source.

- You can hurt your fingers if they are caught between the ADC Cassette and the edge of the input slot. Insert the cassette in the input buffer as described in *'Reading an image plate'* on page *29*. At all times, keep your fingers clear of the input slot. As soon as the cassette enters the CR 25.0, release it.

System configuration responsibility

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (e.g. IEC 950 for data processing equipment and IEC 601-1 for medical equipment). Furthermore all configurations shall comply with the valid version of the system standard IEC 601-1-1. Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of the valid version of the system standard IEC 601-1-1. If in doubt, consult your local service organization.

Safety instructions for laser products

The CR 25.0 is a Class 1 Laser Product. It uses a 2x50 mW laser diode, classification class IIIb.

Under normal operating conditions - when both doors are closed - there can be no laser radiation outside the CR 25.0. It is nonetheless imperative that the local radiation safety regulations regarding the protection of staff against scattered radiation are complied with, if the CR 25.0 is located in the immediate vicinity of an X-ray room.

Open the front left and right door only to solve cassette or image plate jams. When you open either of the doors, the power supply of all critical components is switched off automatically as a precaution.

Observe the Caution instructions on the Optical module label:

User interventions other than those described in this manual can be hazardous with regard to laser radiation.

Safety compliance

Certificates

The CR 25.0 complies with:

- the general safety regulations:
  EN 60601-1 :1990 / A1:1993, A2:1995, A13:1996,
  EN 60601-1-2 :2001,
  IEC 601-1 :1988/A1 :1991, A2 :1995,
  IEC 601-1-1 / EN 60601-1-1,
  UL 60601-1:2003,
  CAN / CSA C22.2 No.601.1-M90.
- the laser safety regulations:
  EN 60825-1: 1994 / A1:2002, A2:2001,
  DHHS/FDA 21 CFR, Parts 1040.10 and 1040.11,
  ANSI Z 136-1980.
- EN ISO 14971:2000,
  EN 1041:1998,
  EN 980:1996/A1.

❖ *The Digitizer is in compliance with the EG regulation 93/42/EEC Directive (Medical Device).*

Radio Interference Suppression

It is hereby certified that the Digitizer has interference suppression according to the EN 55011 Class B as well as the FCC Rules CR47 Part 15 Class B (North-America).

Short-range devices

EN 300 330-2 V1.1.1
EN 301 489-03 V1.2.1

For USA only:
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. In case the equipment causes harmful interference to other devices, see the User manual for help.

Operating modes

The CR 25.0 can be operated in three modes: operator mode, key-operator mode, and service mode.

Operator mode

The operator mode groups all basic functions which are aimed at radiographers:

- Reading an image plate;
- Reading an emergency image plate;
- Re-erasing an image plate;
- Reading the identification data of a cassette (Dedicated configuration only);
- Changing the image plate type (Dedicated configuration only).

All functions of the operator mode are described in *Chapter 2, 'Basic operation ('Operator mode')'*.

Key-operator mode

The key-operator mode groups advanced functions which are aimed at technicians.

The key-operator mode can be accessed via the Key-operator key on the keypad and is menu-driven. The key-operator functions are described in *Chapter 3, 'Advanced operation ('Key-operator mode')'* .

Service mode

The service mode functions are reserved for trained service personnel. They are password protected.

Configurations

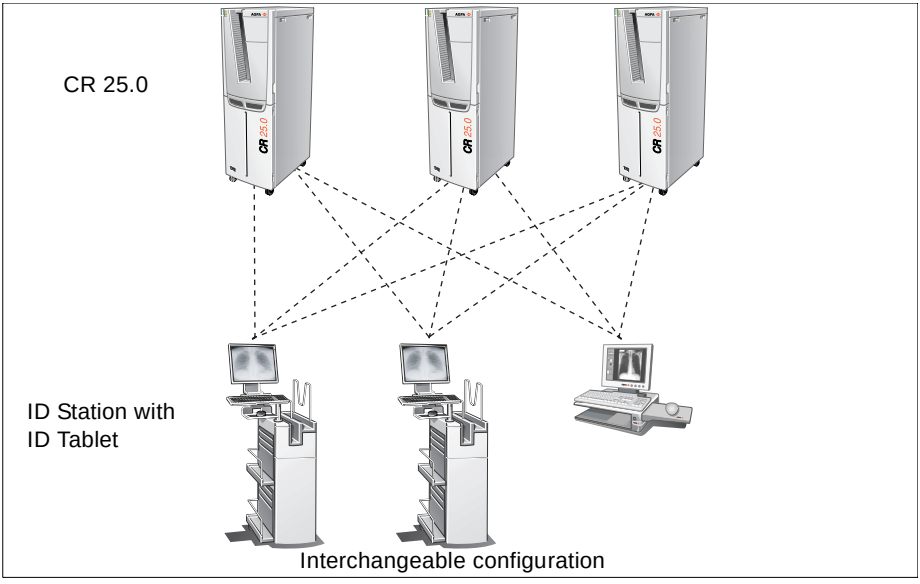
The CR 25.0 can be used in two configurations: either one or more ID Stations serve a range of Digitizers, or one ID Station is dedicated to one Digitizer. For the ID Station a CR User Station with included ID Tablet can be used as well as a stand-alone ID Tablet. The ID Software installed on the PC is slightly different depending on the configuration. For more information, contact your local service organization.

Interchangeable configuration

One or more ID Stations can serve a range of Digitizers, provided that each ID Station has an ID Tablet. There is no physical link required between the ID Station and the Digitizer.

In this configuration, a cassette can be identified via any of the ID Stations and subsequently be scanned using any of the Digitizers. The patient demographic data and examination data are entered via the ID Viewer Software and stored in the memory chip of the ADC cassette via the ID Tablet. As a result the identification data are linked to the cassette and any Digitizer can be used to scan the cassette.

The interchangeable configuration allows the flexible use of several Digitizers and ID Stations / CR User Stations depending on the workload.

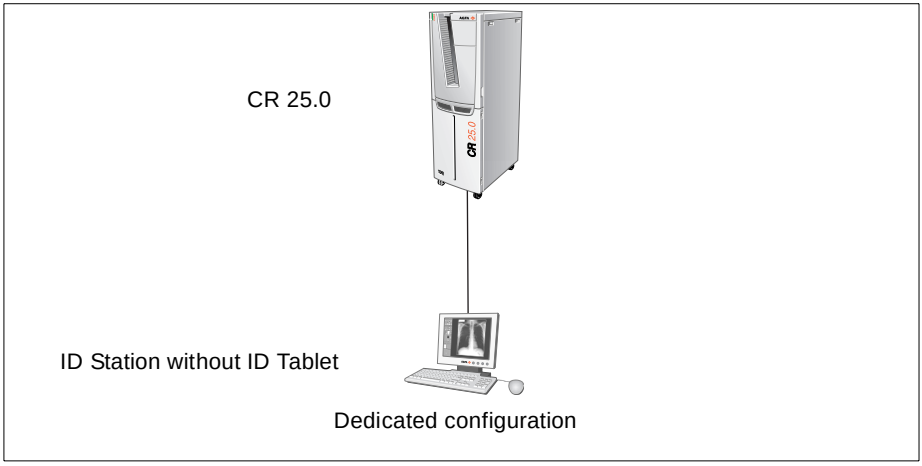


Interchangeable configuration

Dedicated configuration

If one ID Station is dedicated to one Digitizer, cassettes can be identified without using an ID Tablet. The identification data are transmitted from the ID Station to the Digitizer via the network.

The dedicated configuration reduces the time required for identifying and scanning a cassette because both actions can be performed simultaneously.



Dedicated configuration

❖ *In the dedicated configuration, you can still use the CR 25.0 to digitize cassettes which have been identified on an ID Station or a CR User Station.*

The user interface

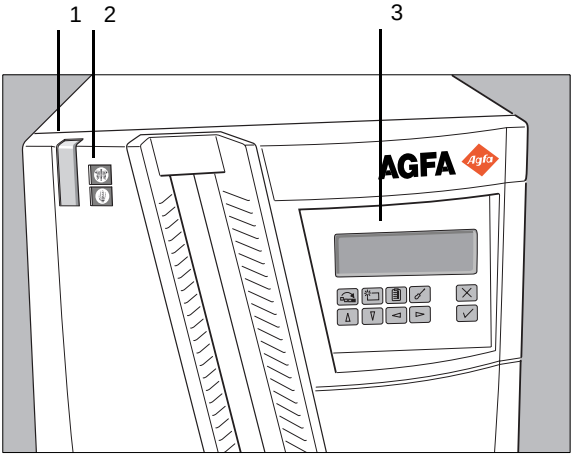
The CR 25.0 has three operation modes:

- the **operator mode** for basic operation;
- the **key-operator mod**e for advanced operation;
- the **service mode** reserved for trained service personnel.

The functions of the operator mode are described in *Chapter 2, 'Basic operation ('Operator mode')'*. The functions of the key-operator mode are detailed in *Chapter 3, 'Advanced operation ('Key-operator mode')'*.

The CR 25.0 interfaces with the user via:

- a keypad and a display;
- a status indicator;
- emergency buttons;
- audio signals.



1	Status indicator
2	Emergency buttons
3	Keypad and display

The keypad

The CR 25.0 keypad features the following keys:

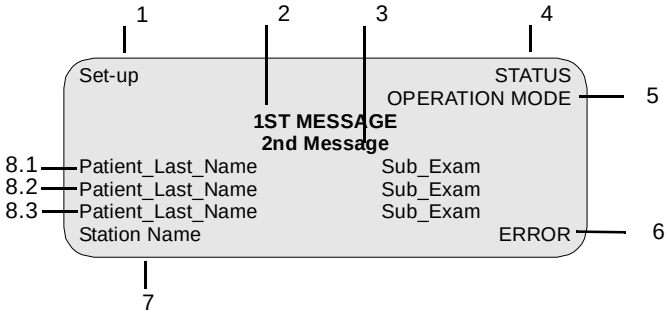
	Emergency key	To give an image priority to be sent to the image processing station if other images are already waiting in the image queue. This key can only be used for unidentified cassettes.
	Erase key	To erase images without digitizing them. This must be done if: • an image plate has not been used for more than 3 days; • an image plate has been exposed to an exceptionally high X-ray dose.
	Key-operator key	To access advanced functions (‘key-operator functions’).
	Service key	To access service-level functions. Reserved for trained service personnel.
	Escape key	To quit the current function or exit a menu without saving modifications.
	Confirm key	In key-operator mode: • to select a menu. • to accept an entry in a menu and go back to operator mode.

	**Up** key	• To move the cursor to the previous entry field. • To scroll upwards. • To increment the number in a numeric entry field.
	**Down** key	• To move the cursor to the next entry field. • To scroll downwards. • To decrement the number in a numeric entry field.
	**Left** key	• To scroll backwards through multiple choices within a field. • To move the entry position in a numerical entry field from right to left. • To toggle between values in a field.
	**Right** key	• To scroll forwards through multiple choices within a field. • To move the entry position in a numerical entry field from left to right. • To toggle between values in a field.

The display

The CR 25.0 control panel has a backlit LCD display with 8 lines of 40 characters each. Its lay-out depends on the operating mode.

- In **operator mode**, the display has dedicated areas for specific information:



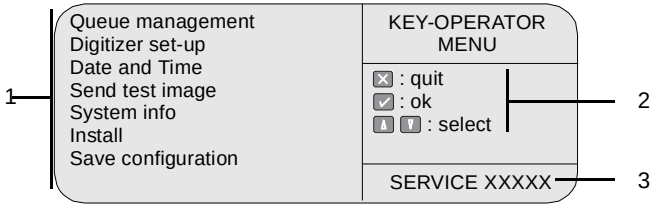
1	Set-up of image processing station: • [blank]: Default image processing station selected. • Off line: Transmission to all image processing stations disabled. • [process.station] not ready: Image processing station not available. • [process.station] rerouted: Images rerouted to other image processing station (ask the Agfa service technician if your system supports this configuration).
2	Type of message
3	Extra comment or action to take
4	System status: • READY: The CR 25.0 is ready for operation. • BUSY: The CR 25.0 is treating an image plate. • ERROR: An error has occurred. Refer to *Chapter 4, 'Preventive maintenance and troubleshooting'*. • LOCKED: id. • WARNING: id.

5	Operation mode: • [blank]: Normal operation mode. • EMERGENCY: Emergency function for image plates with ID data. • EMERGENCY BUTTON: Emergency function for image plates without ID data. • ERASURE: Re-erasure function. • DIRECT ID: Operation in dedicated configuration.
6	Error status: service code (SERVICE XXXXX) or error code (CODE XXXXX)
7	Station name of the CR 25.0
	Identifier of image plate being treated:
8.1	After image ID data is read;
8.2	During scanning of image plate and transmittal of image data;
8.3	During transmittal of image data to image processing station.

The operator main screen is:

When the CR 25.0 is treating an image plate, it displays the following screen:

- In **key-operator mode**, operation is menu driven. The menu displays the key-operator functions, the active keys, and the service code.



1	Key-operator functions
2	Active keys
3	Service code

- In **operator mode** and in **key-operator mode**, both informational and warning messages can be displayed. Informational messages are displayed as black text against a white background; warning messages are displayed in reverse mode.

The status indicator

The light at the top of the CR 25.0 indicates the status of the CR 25.0.

Color	Constant/ Flashing	Status	Action
Green	Constant	Ready.	Proceed.
	Flashing	• Busy (treating image plate). • Reading identification data of a cassette.	Wait.
Red	Constant	Error.	• Check display for messages. • Refer to *Chapter 4, 'Preventive maintenance and troubleshooting'*.
	Flashing	Initializing a cassette.	Wait.
	Flashing	• Locked or warning. • Power on/self-test in progress. • Key-operator mode. • Service mode. • CR 25.0 not connected to image processing station.	• Check display for messages. • Refer to *Chapter 4, 'Preventive maintenance and troubleshooting'*.

Emergency buttons

Two emergency buttons are located at the front of the CR 25.0. The emergency buttons determine the speed class, i.e. the sensitivity, which will be used to digitize the image plate. The sensitivity associated with the emergency buttons has been set during the configuration of your system. For more information, contact your local service organization.

The emergency buttons have the following labels:

	For digitizing images of the trunk.
	For digitizing images of the limbs.

- In the **interchangeable configuration**, the emergency buttons allow you to digitize emergency image plates without ID data.

- In the **dedicated configuration**, the emergency buttons allow you to digitize an image plate while you are entering the identification data via the ID Station.

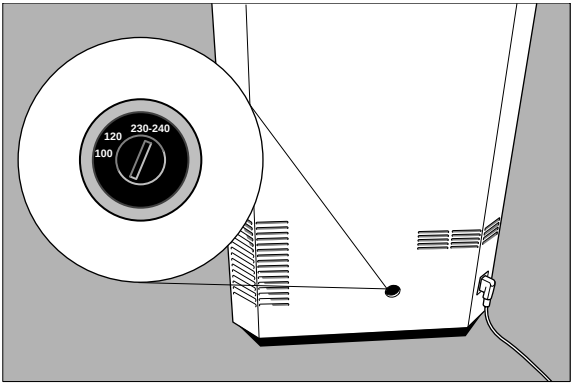
Audio signals

The CR 25.0 gives status information via beeps. The length of the beep indicates the response of the system to a key command.

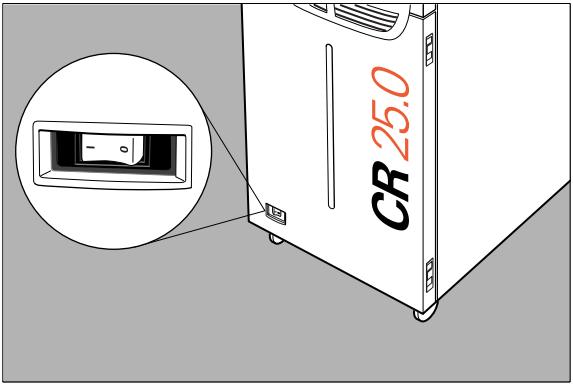
- A **short** beep means that CR 25.0 has accepted the key command and is starting the operation.
- A **long** beep means that you have pressed a non-active key or that the CR 25.0 has rejected the key command.
- An **interval** beep accompanies an error, locked or warning message. Refer to *Chapter 4, 'Preventive maintenance and troubleshooting'*.

Switching on the CR 25.0

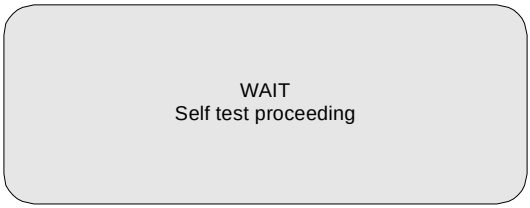
1 Make sure that the setting of the voltage selector at the back of the machine matches the power supply voltage.



2 Locate the main switch and place it in position ‘I’.



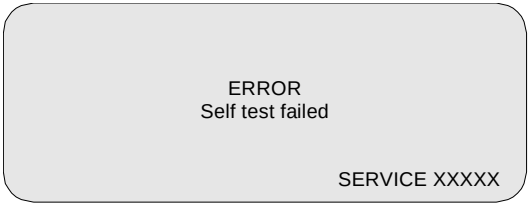
The machine starts a self-test which may take up to 3 minutes. The following screen is displayed:



❖ *During the self-test, you cannot activate any functions.*

If the CR 25.0 has completed the self-test successfully, the CR 25.0 enters the operator mode and displays the operator main screen:

❖ *If the CR 25.0 displays:*



... contact your local service organization.

Switching off the CR 25.0

Before switching off

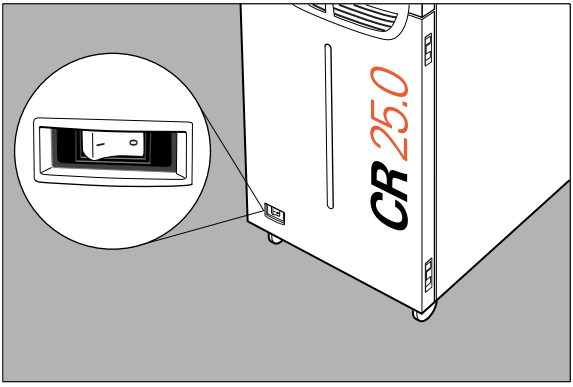
Check that the CR 25.0 is not scanning an image plate. If the CR 25.0 is scanning an image plate, the status indicator at the top of the machine is green and flashing.

Switching off

It is recommended to switch off the CR 25.0 at the end of the day.

Leave the CR 25.0 on if you intend to use it overnight. Switching on the CR 25.0 takes approximately 3 minutes. During this time emergency digitizing is not possible!

Place the main switch in position ‘0’.



Chapter 2

Basic operation (‘Operator mode’)

This chapter provides basic information on how to digitize image plates under normal conditions and in emergency situations. It also treats how to re-erase an image plate to prevent ghost images caused by previous exposures or by stray radiation. These functions are available in operator mode.

- ❑ Workflow
- ❑ Reading an image plate
- ❑ Reading an emergency image plate
- ❑ Re-erasing an image plate
- ❑ Reading the identification data of a cassette (Dedicated configuration only)
- ❑ Changing the image plate type (Dedicated configuration only)

Workflow

The workflow for identifying cassettes and digitizing image plates depends on the configuration of your system.

- In the **interchangeable configuration** a cassette is uniquely identified by the identification data in the cassette chip. Therefore, you must first identify the cassette via the ID Station with ID Tablet before you can digitize the image plate. Refer to *'Reading an image plate in the interchangeable configuration' on page 29*.

  - *An exception are emergency image plates which you can digitize without having identified the cassette. The unidentified emergency image plate will be given default ID data. Refer to 'Reading an emergency image plate in the interchangeable configuration' on page 35.*

- In the **dedicated configuration** the identification data are transmitted from the ID Station to the dedicated CR 25.0 via the network. Therefore, the CR 25.0 can digitize the image plate while you are entering the identification data on the ID Station. Refer to *'Reading an image plate in the dedicated configuration' on page 32*.

Reading an image plate

The main function of the CR 25.0 is digitizing image plates and transmitting the digital image data to the preview station and the image processing station. The actual workflow depends on the configuration of your system.

Reading an image plate in the interchangeable configuration

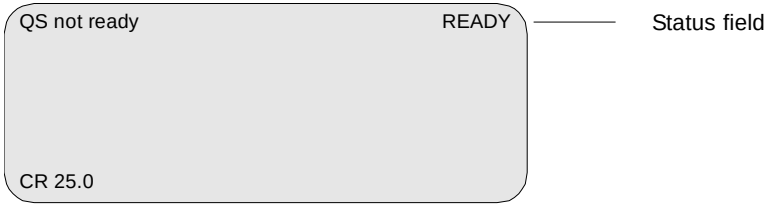
In the interchangeable configuration, you must first identify the cassette via an ID Station with ID Tablet before you can digitize the image plate.

To read an image plate:

1 Make sure the cassette has been identified properly via the ID Station.

2 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with ‘Ready’ status, e.g.:

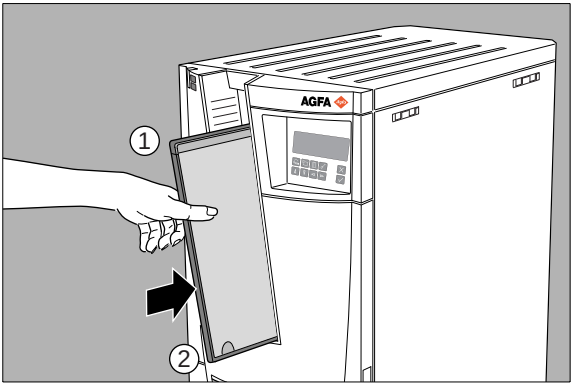


- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

❖ *The CR 25.0 is operational if the status field equals ‘READY’, even if status messages of the destination are shown (e.g. ‘QS not ready’).*

3 Insert the cassette containing the image plate into the cassette slot of the CR 25.0 as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



While treating the image plate, the CR 25.0 will display the following screen:

The CR 25.0:

- reads the cassette identification data;
- converts the information of the latent image to digital data;
- erases the image plate and re-inserts it into the cassette;
- gives the cassette ID data the status ‘erased’;
- returns the cassette;
- transmits the digital image data to the image processing station (‘destination’).

When the CR 25.0 has treated the cassette, it displays the operator main screen.

❖ If the CR 25.0 displays an error message, refer to *Chapter 4, ‘Preventive maintenance and troubleshooting’*.

4 Remove the cassette from the cassette slot.

When the CR 25.0 returns the cassette, it is ready to be re-used immediately. However, if you leave it for more than 3 days before re-using it, you must re-erase it first. Refer to 'Re-erasing an image plate' on page 42.

Reading an image plate in the dedicated configuration

In the dedicated configuration, the CR 25.0 can digitize the image plate while you are entering the identification data via the ID Station.

To read an image plate:

1 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with 'Ready' status, e.g.:

- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

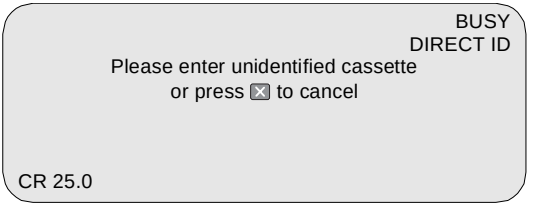
❖ *The CR 25.0 is operational if the status field equals 'READY', even if status messages of the destination are shown (e.g. 'QS not ready').*

2 Press the appropriate emergency button at the front of the CR 25.0.

The emergency button determines the speed class, i.e. the sensitivity, which will be used to digitize the image plate.

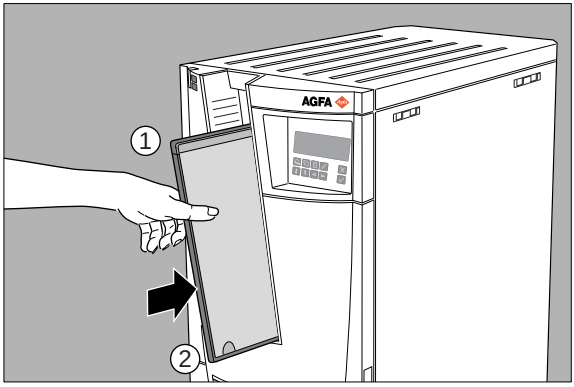
	For digitizing images of the trunk.
	For digitizing images of the limbs.

The button which you have pressed will be lit and the display will read:



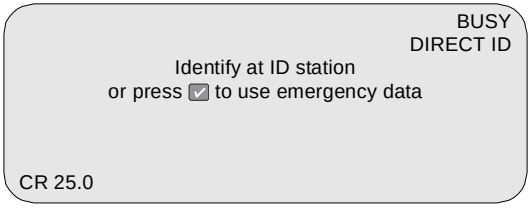
3 Insert the cassette containing the image plate into the cassette slot of the CR 25.0 as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



The CR 25.0 starts digitizing the image plate. You can enter the identification data, refer to step **4**.

While treating the image plate, the CR 25.0 will display the following screens:



The CR 25.0 converts the information of the latent image to digital data.

❖ *If the CR 25.0 displays an error message, refer to Chapter 4, 'Preventive maintenance and troubleshooting'.*

4 Enter the identification data via the ID Station.

For detailed information, refer to the User manual of the ADC ID Software.

As soon as you have entered the identification data, the CR 25.0 displays:

As soon as the CR 25.0 has digitized the entire image plate and you have entered the identification data:

- the CR 25.0 erases the image plate and re-inserts it into the cassette;
- the CR 25.0 gives the cassette ID data the status ‘erased’.
- the cassette is returned to the cassette slot;
- the digital image data is sent to the image processing station (‘destination’).

When the CR 25.0 has treated the cassette, it displays the operator main screen.

5 Remove the cassette from the cassette slot.

When the CR 25.0 returns the cassette, it is ready to be re-used immediately. However, if you leave it for more than 3 days before re-using it, you must re-erase it first. Refer to ‘Re-erasing an image plate’ on page 42.

Reading an emergency image plate

You may have an image plate which you wish to give priority over other image plates which are being processed by the image processing station. Such image plates are referred to as 'emergency image plates'. The actual workflow depends on the configuration of your system.

Reading an emergency image plate in the interchangeable configuration

In the interchangeable configuration, you can treat either:

- emergency image plates with ID data via the Emergency key on the keypad;
- emergency image plates without ID data via the emergency buttons at the front of the CR 25.0.

Reading emergency image plates with ID data

To read an emergency image plate with ID data:

1 Make sure the cassette has been identified properly via the ID Station.

2 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with ‘Ready’ status, e.g.:

- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

❖ *The CR 25.0 is operational if the status field equals ‘READY’, even if status messages of the destination are shown (e.g. ‘QS not ready’).*

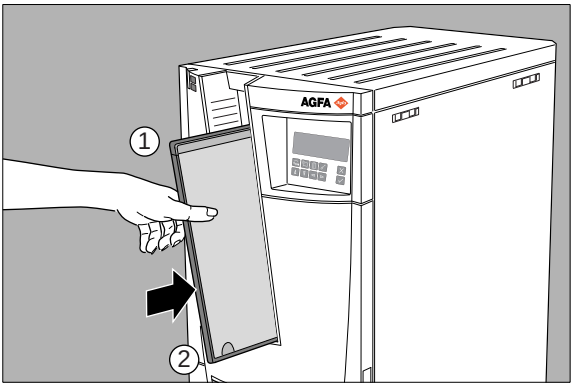
3 Press the Emergency key on the keypad.

The display will read:

The emergency status will only be assigned to the first image plate which you insert into the CR 25.0 cassette slot after pressing the Emergency key.

4 Insert the cassette containing the emergency image plate into the cassette slot as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



When the CR 25.0 has treated the emergency image plate, it displays the operator main screen. The image processing station will give the emergency image priority over the other images in the image processing queue.

❖ *If you do not enter a cassette within 1 minute after pressing the Emergency key or if you enter a cassette without ID data, the CR 25.0 will quit the emergency function and return to the operator main screen.*

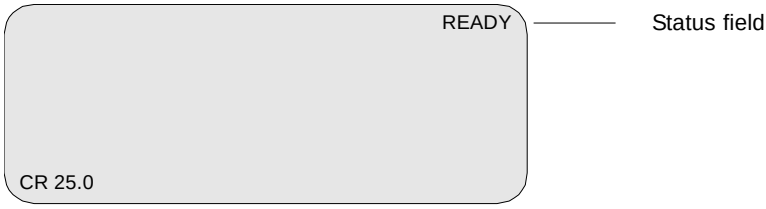
5 Remove the cassette from the cassette slot.

Reading emergency image plates without ID data

To read an emergency image plate without ID data:

1 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with ‘Ready’ status, e.g.:



- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

❖ *The CR 25.0 is operational if the status field equals ‘READY’, even if status messages of the destination are shown (e.g. ‘QS not ready’).*

2 Press the appropriate emergency button at the front of the CR 25.0.

The emergency button determines the speed class, i.e. the sensitivity, which will be used to digitize the image plate.

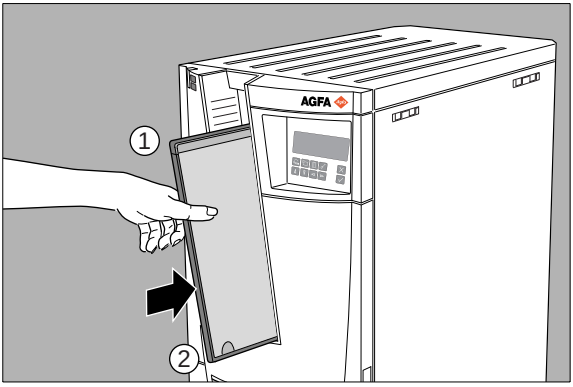
	For digitizing unidentified emergency images of the trunk.
	For digitizing unidentified emergency images of the limbs.

The button which you have pressed will be lit and the display will read:

The emergency status will only be assigned to the first image plate which you insert in the CR 25.0 cassette slot after pressing the emergency button.

3 Insert the cassette containing the emergency image plate into the cassette slot as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



The image plate will be digitized using the speed class, i.e. the sensitivity, corresponding to the emergency button as defined during configuration.

When the CR 25.0 has treated the emergency image plate, it displays the operator main screen. The digital image data are transmitted to the image processing station accompanied by default ID data. The image processing station will give the emergency image priority over the other images in the image processing queue.

- *If you do not enter a cassette within 15 seconds after pressing the emergency button, the CR 25.0 will quit the emergency button function and return to the operator main screen.*

- *To change the speed class corresponding to the emergency button, contact your local service organization.*

4 Remove the cassette from the cassette slot.

Reading an emergency image plate in the dedicated configuration

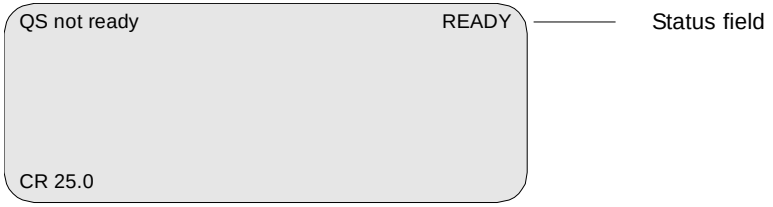
In the dedicated configuration, you can digitize unidentified emergency image plates. The digital image data will be assigned default ID data.

To digitize an emergency image plate, you must press the Confirm key after you have inserted the cassette (refer to step 4). Image data transmission to the preview and the image processing station will be suspended until you have pressed the Confirm key.

To read an emergency image plate:

1 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with 'Ready' status, e.g.:



- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

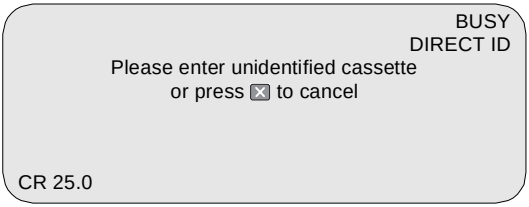
❖ *The CR 25.0 is operational if the status field equals 'READY', even if status messages of the destination are shown (e.g. 'QS not ready').*

2 Press the appropriate emergency button at the front of the CR 25.0.

The emergency button determines the speed class, i.e. the sensitivity, which will be used to digitize the image plate.

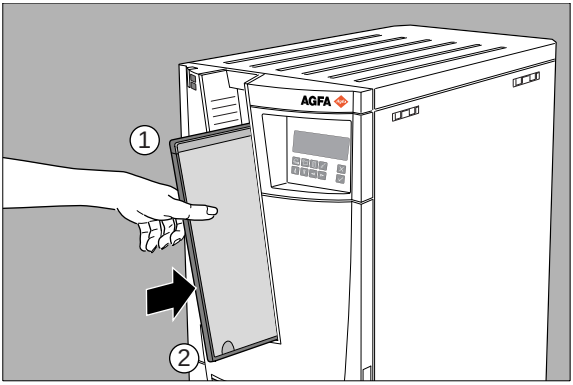
	For digitizing images of the trunk.
	For digitizing images of the limbs.

The button which you have pressed will be lit and the display will read:



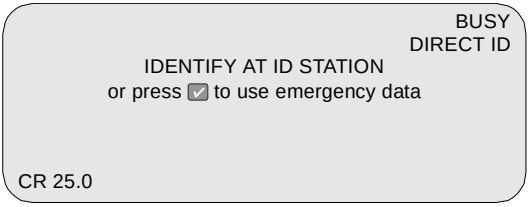
3 Insert the cassette containing the image plate into the cassette slot of the CR 25.0 as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



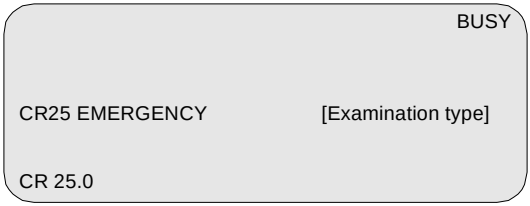
The CR 25.0 starts digitizing the image plate.

While treating the image plate, the CR 25.0 will display the following screen:



4 Press the Confirm key.

The CR 25.0 displays:



- If you pressed the emergency button for digitizing images of the limbs, [Examination type] equals ‘Extremities‘.
- If you pressed the emergency button for digitizing images of the trunk, [Examination type] equals ‘Corpus’.

When the CR 25.0 has treated the emergency image plate, it displays the operator main screen. The digital image data are transmitted to the image processing station accompanied by default ID data. The image processing station will give the emergency image priority over the other images in the image processing queue.

5 Remove the cassette from the cassette slot.

Re-erasing an image plate

At the end of a normal or emergency digitizing cycle, the CR 25.0 returns an erased image plate. However, in the following cases, you must re-erase the image plate before re-using it in order to prevent ghost images from interfering with the image of interest:

- If the image plate has not been used for more than 3 days.
  In this case, the image plate may have been exposed to stray radiation.
- If an image plate has been exposed to an exceptionally high X-ray dose.
  In this case, deep layers of the image plate may still retain a latent image after standard erasure. Leave the image plate to rest at least one day before re-erasing it.

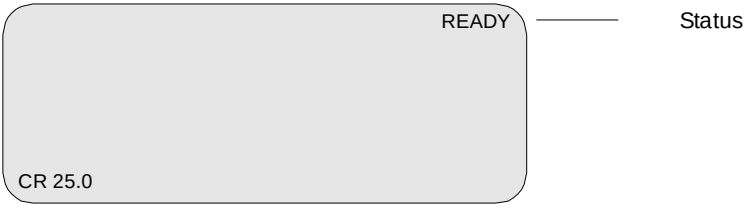
You can erase image plates which you have given the status ‘to be erased’ via the ID Station or image plates which have the status ‘erased’.

Re-erasing image plates with status ‘erased’

To re-erase an image plate which has been erased as part of a normal or emergency digitizing cycle:

1 Check that the CR 25.0 is ready for operation:

- the CR 25.0 must display the operator main screen with ‘Ready’ status, e.g.:



- the status indicator at the top of the CR 25.0 must be green and be lit constantly.

2 Press the Erase key on the keypad.

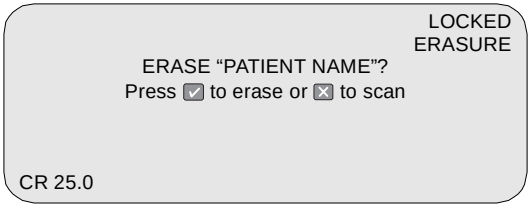
The display will read:

3 Insert the cassette into the cassette slot.

While erasing, the CR 25.0 will still display the above screen. When the CR 25.0 has erased the image plate, it displays the operator main screen.

Warning

If the above screen is not displayed but the display reads:



you have entered a cassette with ID data not having the status ‘erased’. You now have the choice: either cancel erasing or erase the image plate.

- To cancel erasing and make a regular scan: press the Escape key.

- To erase the image plate: press the Confirm key.

While erasing, the CR 25.0 will display:

When the CR 25.0 has erased the image plate, it displays the operator main screen.

4 Remove the cassette from the cassette slot.

Re-erasing image plates with status ‘to be erased’

To re-erase an image plate which you have given the status ‘to be erased’ via the ID station:

1 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with ‘Ready’ status, e.g.:

- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

2 Insert the cassette into the cassette slot.

The CR 25.0 will automatically erase the image plate. The display will read:

When the CR 25.0 has erased the image plate, it displays the operator main screen.

3 Remove the cassette from the cassette slot.

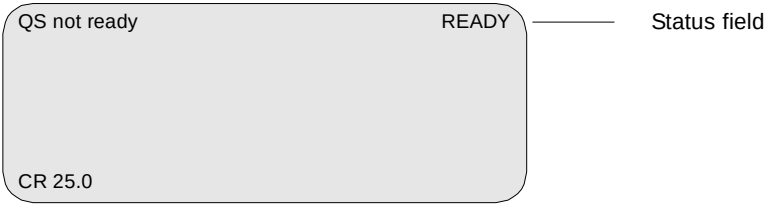
Reading the identification data of a cassette (Dedicated configuration only)

In the dedicated configuration, the identification data stored in the memory chip of the cassette can be read via the CR 25.0.

To read the identification data of a cassette:

1 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with ‘Ready’ status, e.g.:



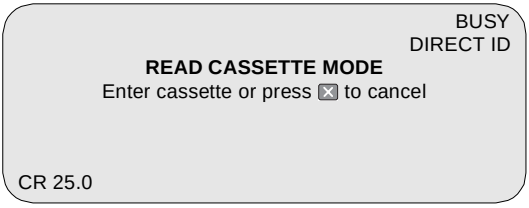
- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

❖ *The CR 25.0 is operational if the status field equals ‘READY’, even if status messages of the destination are shown (e.g. ‘QS not ready’).*

2 In the ID Software on the ID Station, select the mode for reading cassettes.

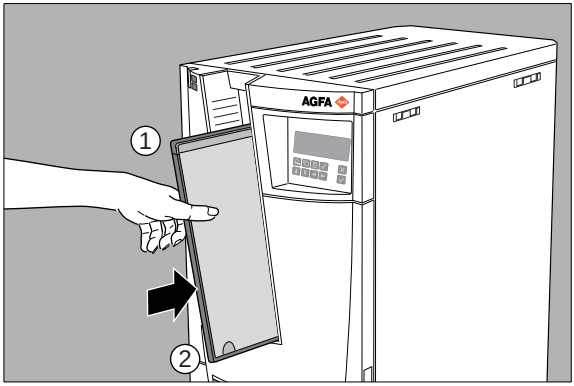
Refer to the User manual of the ID Software.

The display of the CR 25.0 will read:



3 Insert the cassette containing the image plate into the cassette slot of the CR 25.0 as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



While the CR 25.0 reads the identification data from the cassette chip, the status indicator at the top of the machine is red and flashing.

The identification data will be displayed on the ID Station. Subsequently, the CR 25.0 returns the cassette to the cassette slot and displays the operator main screen.

4 Remove the cassette from the cassette slot.

Changing the image plate type (Dedicated configuration only)

If you use new generation ADC phosphor plates, the cassettes containing the plates must first be initialized. The new generation of plates can be identified by the plate type and the initializing code printed on the back (e.g. MD 30 19).

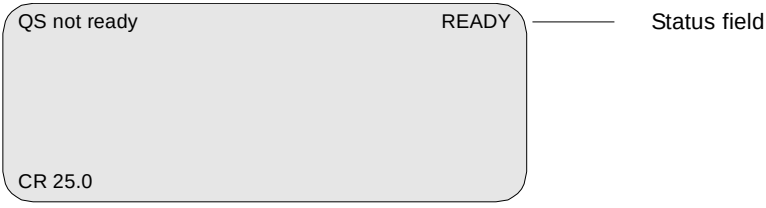
If you purchased cassettes already containing ADC phosphor plates, the cassettes are ready for use. If you purchased ADC phosphor plates or cassettes separately, the cassettes must be initialized first.

In the dedicated configuration, you can initialize cassettes via the CR 25.0.

To initialize a cassette:

1 Check that the CR 25.0 is ready for operation:

- The CR 25.0 must display the operator main screen with 'Ready' status, e.g.:



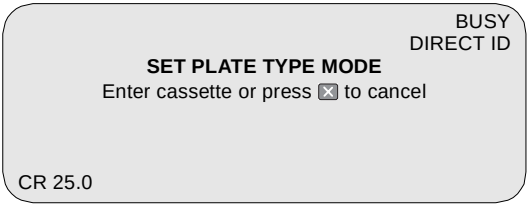
- The status indicator at the top of the CR 25.0 must be green and be lit constantly.

❖ *The CR 25.0 is operational if the status field equals 'READY', even if status messages of the destination are shown (e.g. 'QS not ready').*

2 In the ID Software on the ID Station, select the mode for initializing cassettes.

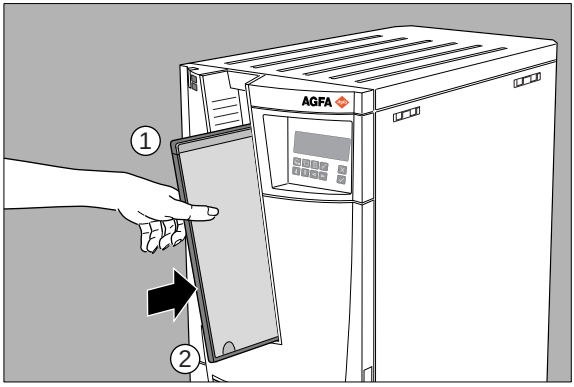
Refer to the User manual of the ID Software.

The display of the CR 25.0 will read:



3 Insert the cassette containing the image plate into the cassette slot of the CR 25.0 as shown below.

Make sure to insert the cassette with the hinge [1] at the top and the locking mechanism [2] at the bottom.



4 Enter the initialization code in the ID Software.

Refer to the User manual of the ID Software.

While the CR 25.0 initializes the cassette, the status indicator at the top of the machine is red and flashing.

When the cassette has been initialized, the CR 25.0 returns the cassette to the cassette slot and displays the operator main screen.

5 Remove the cassette from the cassette slot.

Chapter 3

Advanced operation (‘Key-operator mode’)

This chapter covers the following topics:

- Consulting the image transmission queue (‘Queue management’)
- Customizing the CR 25.0 (‘Digitizer set-up’)
- Setting the date and time
- Sending test images
- Consulting information on the CR 25.0
- Installing a new software version
- Installing a new language
- Installing new customer parameters
- Saving the configuration data on a diskette (backup)

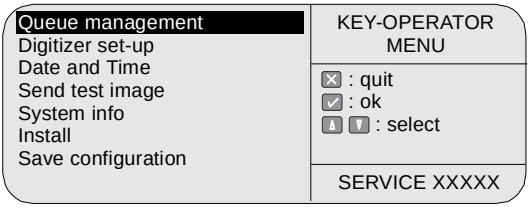
Consulting the image transmission queue (‘Queue management’)

As soon as the ID data of an image plate is read, the image identifier is stored in a queue. This queue contains information about which images are being transmitted to a certain image processing station (‘destination’) and their status. In key-operator mode, you can view this information and erase images from the image transmission queue.

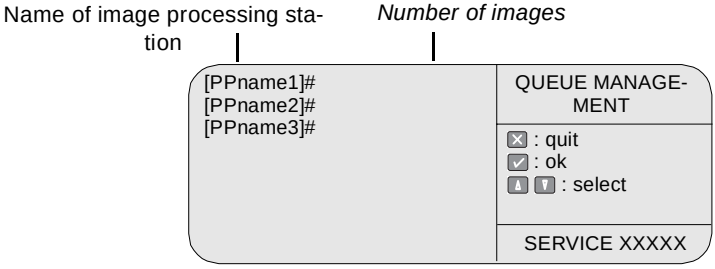
Consulting the images in the queue

To view which images are being transmitted to a certain image processing station:

1 In the key-operator main menu, select ‘Queue management’ via the Up and Down keys and confirm.

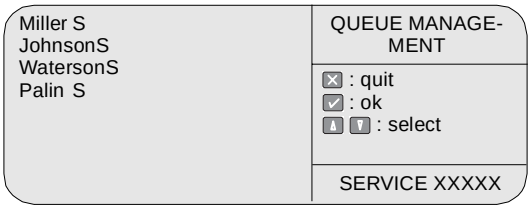


The CR 25.0 will display a list of installed image processing stations and the number of images sent to each:



2 Select the image processing station of your choice via the Up and Down keys and confirm.

The CR 25.0 will display the list of images sent to the image processing station and their status ‘S’:



The status ‘S’ of an image is either:

‘S’	Status	Meaning
Q	**In queue**	Image is waiting in queue to be transmitted.
T	**Transmitting**	Image is being transmitted; CR 25.0 is waiting for acknowledgment.
W	**Warning**	Problem with image processing station.
E	**Exception**	Problem with image, cannot be transmitted.
[blank]	**ok**	Image has been transmitted successfully.

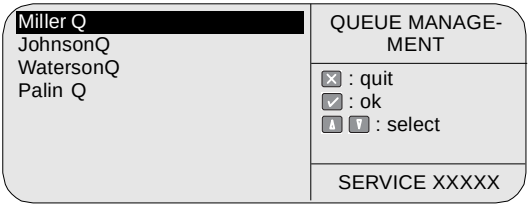
3 To return to the key-operator main menu, press the Escape key twice.

To go to the operator main screen, press the Confirm key.

Deleting images from the queue

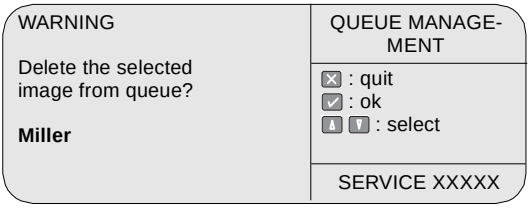
To delete an image from the queue of images which are waiting to be sent to a specific image processing station, proceed as in *'Consulting the images in the queue' on page 52* (steps **1** to **2**). Subsequently, do the following:

1 In the list of images being sent to the image processing station, select the image which you want to delete via the Up and Down keys.



2 Press the Erase key.

The CR 25.0 will display:

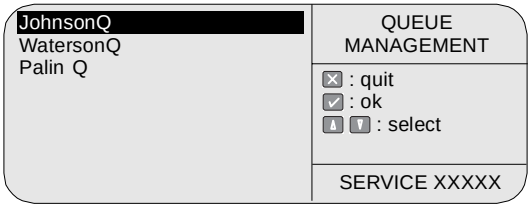


❖ *You can only erase images with status 'Q' (in queue), 'W' (warning) or 'E' (exception).*

3 To erase the image, press the Confirm key.

To cancel erasing, press the Escape key.

After the image has been erased, the Queue management screen is displayed again:



4 To return to the list of installed image processing stations, press the Escape key.

5 To return to the key-operator main menu, press the Escape key.

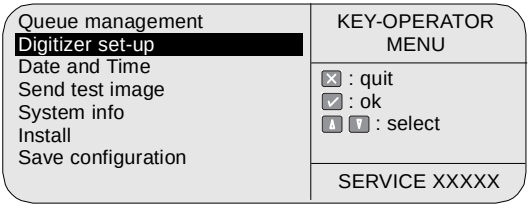
Customizing the CR 25.0 (‘Digitizer set-up’)

Via the Digitizer set-up function in key-operator mode, you can:

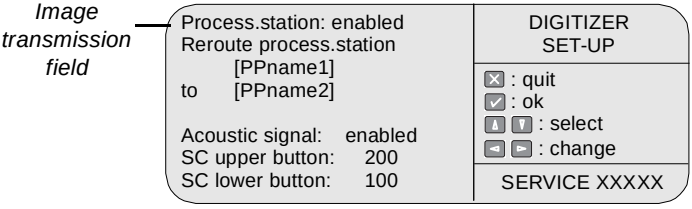
- enable or disable the transmittal of images to all image processing stations;
- reroute images to another image processing station (‘destination’);
- enable or disable all audio signals;
- change the upper and lower speed class values.

Enabling/disabling image transmission

1 In the key-operator main menu, select ‘Digitizer set-up’ via the Up and Down keys and confirm.



The CR 25.0 will display the Digitizer set-up menu:



❖ *If you do not press a key within 1 minute, the CR 25.0 will exit the key-operator mode.*

2 Select the Image transmission field via the Up and Down keys.

3 Enable or disable the image transmission via the Left and Right keys.

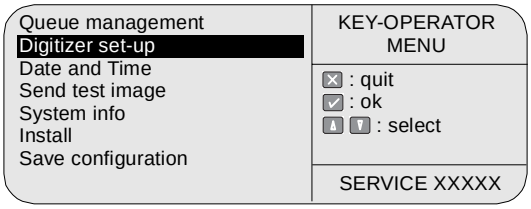
4 Confirm your choice.

The operator main screen is displayed.

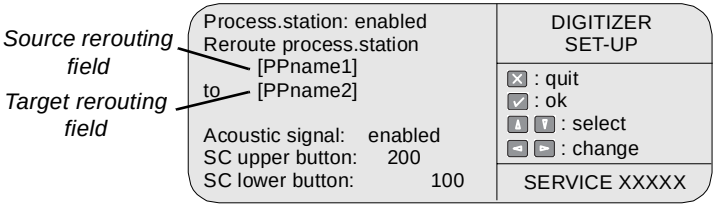
Changing the destination

If an image processing station is out of operation, you can reroute the images to another image processing station. Start as in *'Enabling/disabling image transmission' on page 56*:

1 In the key-operator main menu, select 'Digitizer set-up' via the Up and Down keys and confirm.



The CR 25.0 will display the Digitizer set-up menu:



❖ *If you do not press a key within 1 minute, the CR 25.0 will exit the key-operator mode.*

2 Select the Source rerouting field via the Up and Down keys.

3 Select the image processing station from which you want to redirect the images via the Left and Right keys.

❖ *You can only redirect the images of one image processing station.*

4 Select the Target rerouting field via the Up and Down keys.

5 Select the image processing station to which you want to redirect the images via the Left and Right keys.

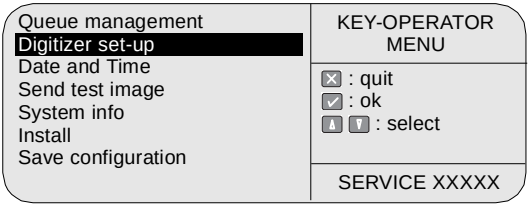
6 Confirm your choice.

The operator main screen is displayed.

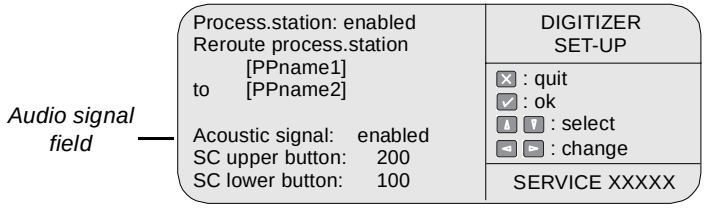
Enabling/disabling all audio signals

To enable or disable all audio signals, start as in *'Enabling/disabling image transmission'* on page *56*:

1 In the key-operator main menu, select 'Digitizer set-up' via the Up and Down keys and confirm.



The CR 25.0 will display the Digitizer set-up menu:



❖ *If you do not press a key within 1 minute, the CR 25.0 will exit the key-operator mode.*

2 Select the Audio signal field via the Up and Down keys.

3 Enable or disable the audio signals via the Left and Right keys.

4 Confirm your choice.

The operator main screen is displayed.

Changing the speed class

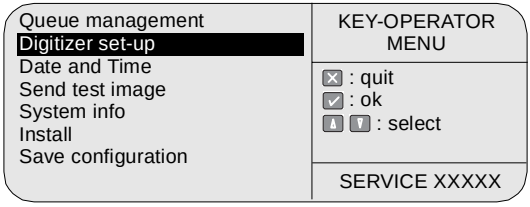
There is a correlation between the two emergency buttons at the front of the CR 25.0 and the speed class values defined in the Digitizer set-up menu. The table below describes the correlation:

	If you press the upper emergency button (trunk) before inserting a cassette, the image plate will be scanned with the speed class selected for"SC upper button" in the Digitizer set-up menu.
	If you press the lower emergency button (limbs) before inserting a cassette, the image plate will be scanned with the speed class selected for"SC lower button" in the Digitizer set-up menu.

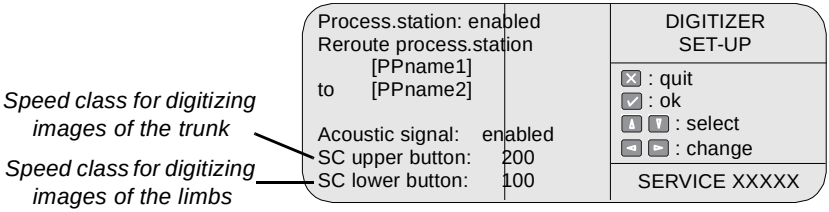
For more information about the emergency buttons, refer to *'Emergency buttons'* on page *23*.

To change the speed class values, proceed as follows:

1 In the key-operator main menu, select 'Digitizer set-up' via the Up and Down keys and confirm.



The CR 25.0 will display the Digitizer set-up menu:



❖ *If you do not press a key within 1 minute, the CR 25.0 will exit the key-operator mode.*

2 Select the SC upper button via the Up and Down keys.

3 Select the desired trunk speed class value via the Left and Right keys.

❖ *Possible values are 25, 50, 100, 200, 400, 600, 800, 1200 and default. Selecting default means that the value will be taken from the CPF file.*

4 Select the SC lower button via the Up and Down keys.

5 Select the desired limbs speed class value via the Left and Right keys.

❖ *Possible values are 25, 50, 100, 200, 400, 600, 800, 1200 and default. Selecting default means that the value will be taken from the CPF file.*

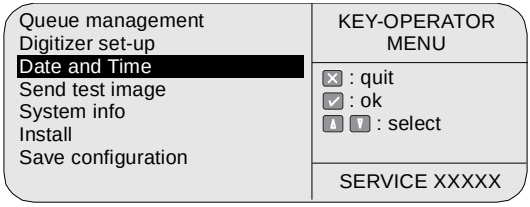
6 Confirm your choice.

The operator main screen is displayed.

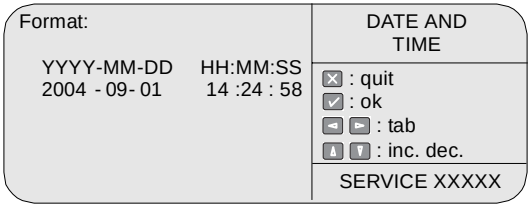
Setting the date and time

To set the clock of the CR 25.0:

1 In the key-operator main menu, select ‘Date and time’ via the Up and Down keys and confirm.



The CR 25.0 will display the Date and time menu:



❖ *If you do not press a key within 1 minute, the CR 25.0 will exit the key-operator mode.*

2 Set the date and time:

- Use the Left and Right keys to select the digit you want to change (‘tab’);
- Use the Up and Down keys to set the digit to the desired value (‘inc. dec.’).

3 Confirm the date and time.

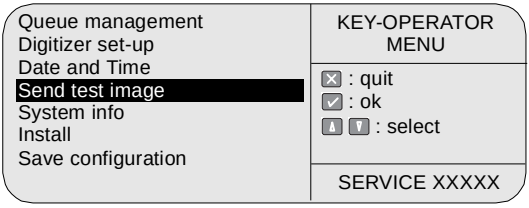
The operator main screen is displayed.

Sending test images

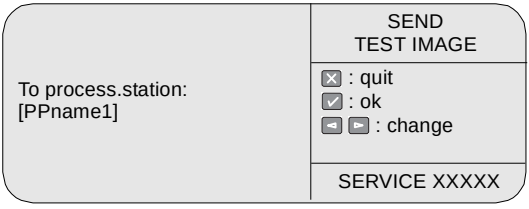
To check the communication between the CR 25.0 and the image processing station, you can send a test image from the Digitizer to the image processing station.

To send a predefined test image to a specific image processing station:

1 In the key-operator main menu, select ‘Send test image’ via the Up and Down keys and confirm.



The CR 25.0 will display the Send test image menu:



❖ *If you do not press a key within 1 minute, the CR 25.0 will exit the key-operator mode.*

2 Select the image processing station to which you want to send the test image via the Left and Right keys.

3 Confirm your choice.

The CR 25.0 will return to the operator screen.

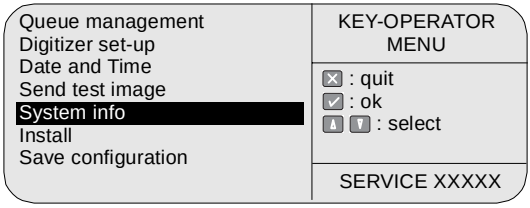
Consulting information on the CR 25.0

Via the System info function in key-operator mode, you can consult:

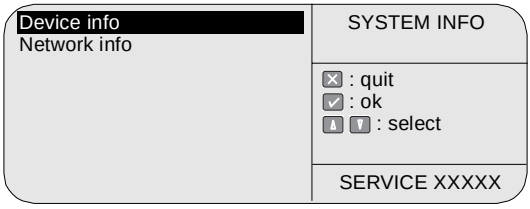
- the device data of the CR 25.0;
- the network parameters of the CR 25.0.

Consulting the device settings

1 In the key-operator main menu, select ‘System info’ via the Up and Down keys and confirm.

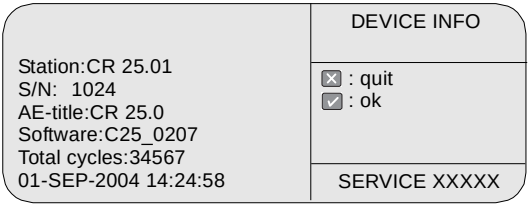


The CR 25.0 will display the System info menu:



2 In the System info menu, select ‘Device info’ via the Up and Down keys and confirm.

The CR 25.0 will display the Device info menu, e.g.:



The Device info menu provides the following information:

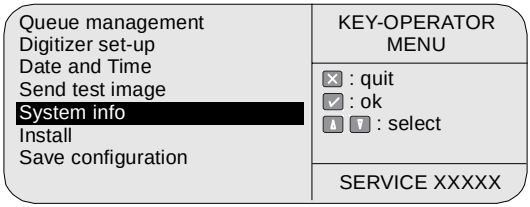
Station	Device name of CR 25.0
S/N	Serial number CR 25.0
AE-title	CR 25.0
Software	Software version of CR 25.0
Total cycles	Total number of image plates which the CR 25.0 has treated
Date	Time and date indication of CR 25.0 clock

3 To return to the key-operator main menu, press the Escape key twice.

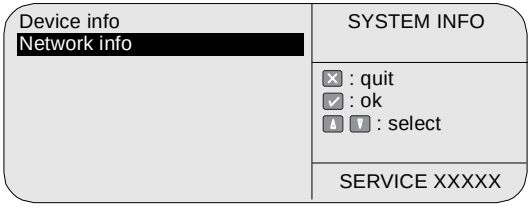
To go to the operator main screen, press the Confirm key.

Consulting the network settings

1 In the key-operator main menu, select ‘System info’ via the Up and Down keys and confirm.

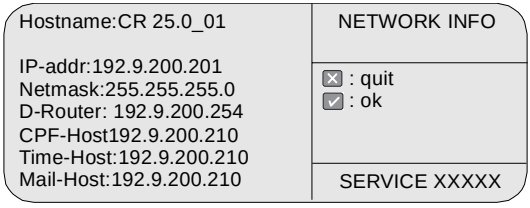


The CR 25.0 will display the System info menu:



2 In the System info menu, select ‘Network info’ via the Up and Down keys and confirm.

The CR 25.0 will display the Network info screen, e.g.:



The Network info screen provides the following information:

Hostname	Name of host computer to which CR 25.0 is connected
IP-address	IP addresses of the CR 25.0, and other related equipment

3 To return to the key-operator main menu, press the Escape key twice.
To go to the operator main screen, press the Confirm key.

Installing a new software version

Via this key-operator function you can copy a new software version from a floppy disk to the hard disk of the CR 25.0 and activate the new software.

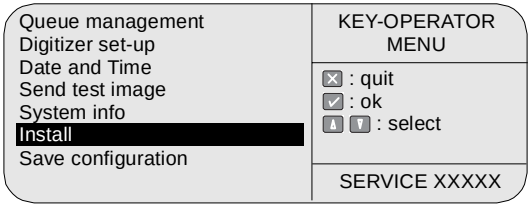
❖ *When an error occurs during installation, refer to Chapter 4, 'Preventive maintenance and troubleshooting'.*

To install a new software version:

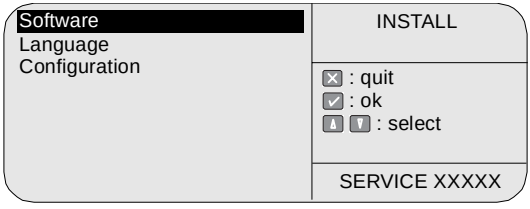
1 Check that the CR 25.0 is not scanning an image plate.

If the CR 25.0 is scanning an image plate, the status indicator at the top of the machine is green and flashing.

2 In the key-operator main menu, select 'Install' via the Up and Down keys and confirm.



The CR 25.0 will display the Install menu:

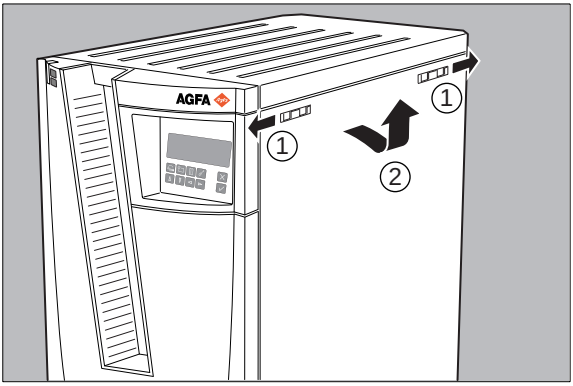


3 In the Install menu, select ‘Software’ via the Up and Down keys and confirm.

The CR 25.0 will display the Install software menu:

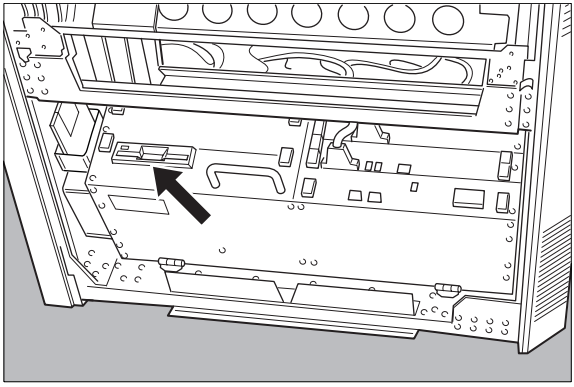
Please remove right side panel and insert the first floppy CR25XXXX in diskette drive and press ☑	INSTALL SOFTWARE
	☒ : quit ☑ : ok
	SERVICE XXXXX

4 Open the side panel by unlocking the two locks at the side of the machine.



5 Remove the side panel.

The disk drive is located at the bottom of the machine.



6 Insert the first floppy with the new CR 25.0 software in the disk drive and press the Confirm key.

The CR 25.0 will display:

Checking the volume label . . . Volume is <label>	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

Please wait . . . copying files to E:\temp	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

extracting. . . E:<file name> to D:temp\<file name>	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

7 Wait until the CR 25.0 displays:

Please remove the floppy and press ☑	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

8 Remove the floppy from the disk drive and press the Confirm key.

If the CR 25.0 displays the screen below, insert the second software floppy:

Please insert the floppy C25_XXXX_2_3 and press ☑	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

XXXX = software version

Proceed similarly for the remaining floppy disks.

9 Wait until the CR 25.0 displays:

SW successfully installed To initialize the new SW a reset is necessary Press ☑ to reset now	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

10 To make the new software operational, press the Confirm key.

The CR 25.0 will restart automatically. After 3 minutes it will display:

New software detected. You should refresh your backup now. Please insert the backup floppy and press ☑	INSTALL SOFTWARE ☒ : quit ☑ : ok SERVICE XXXXX

You must make new backup files with the machine specific configuration data.

11 Insert an empty formatted floppy into the disk drive and press the Confirm key.

The CR 25.0 will start copying the machine specific configuration data while displaying the Save configuration screen:

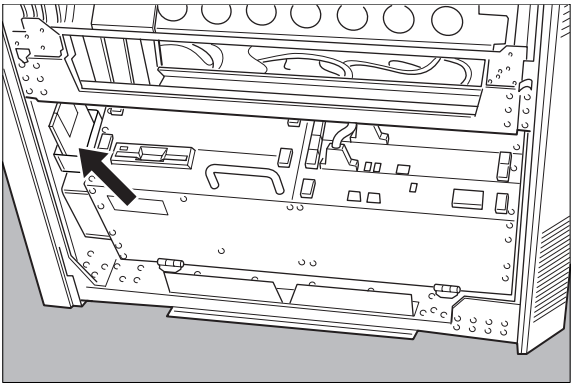
copying . . . D:\C25_<serial#>.zip to A:<path><file name>	SAVE CONFIGURATION ☒ : quit ☑ : ok SERVICE XXXXX

12 When the screen below is displayed, note down the serial number and the date.

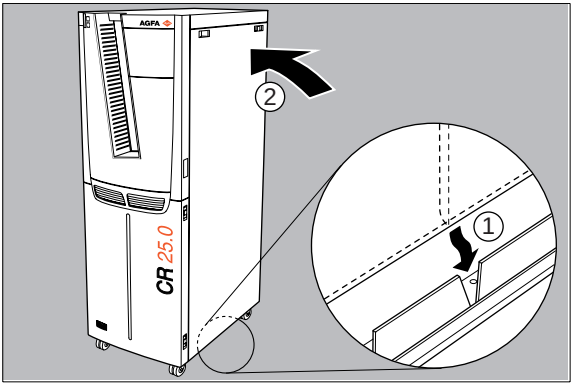
Machine configuration saved. Label the floppy: Backup CR 25.0 S/N: <serial#> Date: <date> Please remove the floppy and press ☑	SAVE CONFIGURATION ☒ : quit ☑ : ok SERVICE XXXXX

13 Remove the floppy from the disk drive and label it with the data from the screen.

14 Store the CR 25.0 software floppies and the backup floppy in the storage box at the bottom of the machine.



15 Reinstall the right side panel.



The CR 25.0 will restart automatically.

After start-up, the operator main screen is displayed.

Installing a new language

Via this key-operator function you can copy new language files from a floppy disk to the hard disk of the CR 25.0 and activate the new language(s).

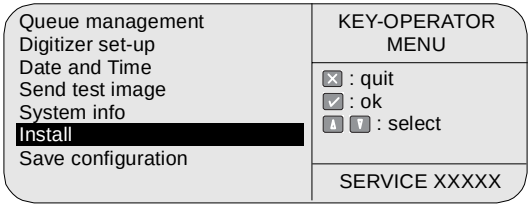
❖ *When an error occurs during installation, refer to Chapter 4, 'Preventive maintenance and troubleshooting'.*

To install new languages:

1 Check that the CR 25.0 is not scanning an image plate.

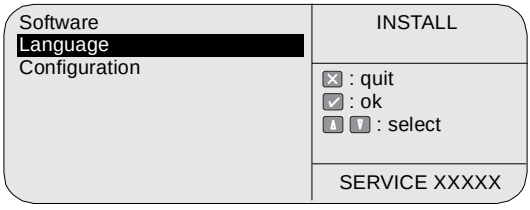
If the CR 25.0 is scanning an image plate, the status indicator at the top of the machine is green and flashing.

2 In the key-operator main menu, select 'Install' via the Up and Down keys and confirm.



The CR 25.0 will display the Install menu.

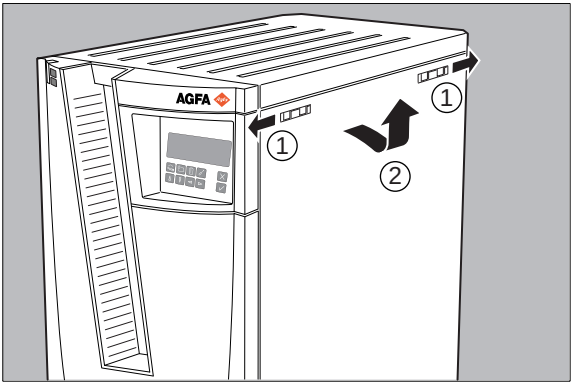
3 In the Install menu, select 'Language' via the Up and Down keys and confirm.



The CR 25.0 will display the Install language menu:

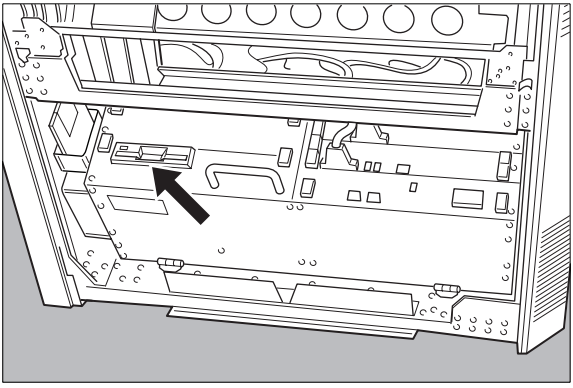
Please remove right side panel and insert the language floppy CR25XXXX and press ☑	INSTALL LANGUAGE ☒ : quit ☑ : ok SERVICE XXXXX

4 Open the side panel by unlocking the two locks at the side of the machine.



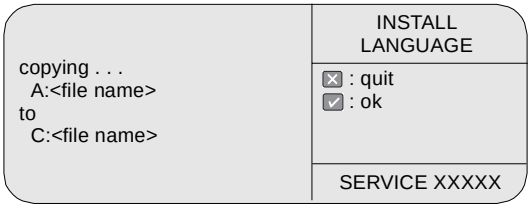
5 Remove the side panel.

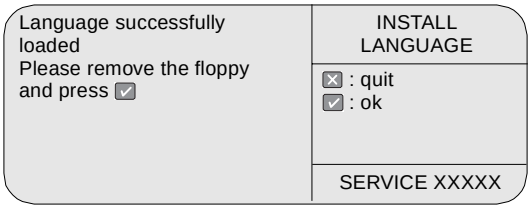
The disk drive is located at the bottom of the machine.



6 Insert the floppy with the new language files in the disk drive and press the Confirm key.

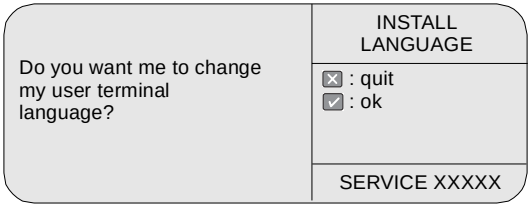
The CR 25.0 will display:





7 Remove the floppy from the disk drive and press the Confirm key.

The CR 25.0 will display:

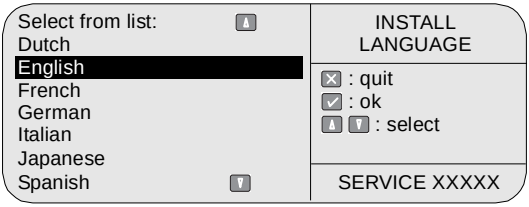


8 You have the choice to change the language of the user interface:

- If you do not want to change the language of the user interface, press the Escape key and proceed with step **10**.

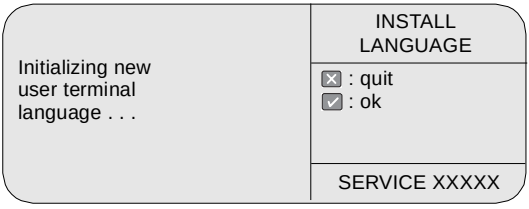
- If you want to change the language, press the Confirm key.

The CR 25.0 will display:



9 Select the desired language from the list via the Up and Down keys and confirm your choice.

The CR 25.0 will display:



10 Wait until the display reads:

Parameters have changed. You should refresh your backup now. Please insert the backup floppy and press ☑	INSTALL LANGUAGE ☒ : quit ☑ : ok SERVICE XXXXX

You must make new backup files with the new parameters.

11 Insert an empty formatted floppy into the disk drive and press the Confirm key.

The CR 25.0 will start copying the machine specific configuration data while displaying the Save configuration screen:

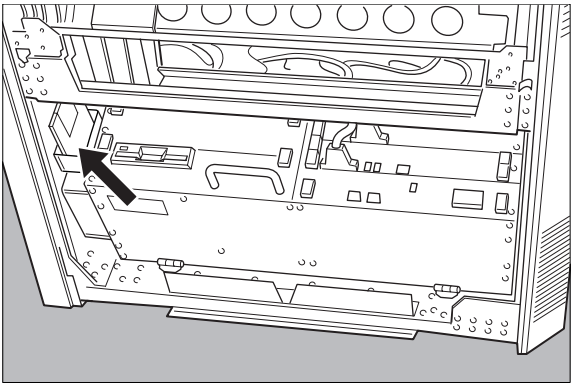
copying . . . D:\C25_<serial#>.zip to A:<path><file name>	SAVE CONFIGURA-TION ☒ : quit ☑ : ok SERVICE XXXXX

12 When the screen below is displayed, note down the serial number and the date.

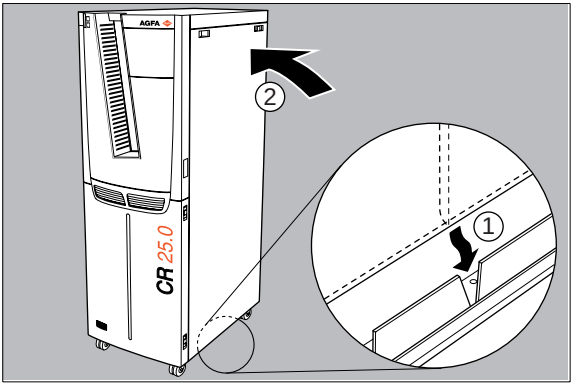
Machine configuration saved. Label the floppy: Backup CR 25.0 S/N: <serial#> Date: <date> Please remove the floppy and press ☑	SAVE CONFIGURA-TION ☒ : quit ☑ : ok SERVICE XXXXX

13 Remove the floppy from the disk drive and label it with the data from the screen.

14 Store the CR 25.0 language floppy and the backup floppy in the storage box at the bottom of the machine.



15 Reinstall the right side panel.



The CR 25.0 will restart automatically.

After start-up, the operator main screen will be displayed.

Installing new customer parameters

Via this key-operator function you can copy new customer parameter files (CPF-files) from a floppy disk to the hard disk of the CR 25.0 and activate the new parameters.

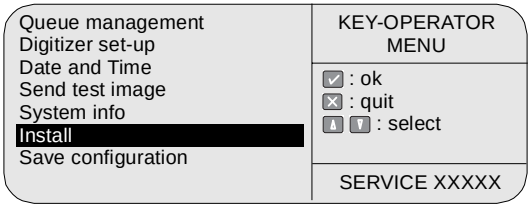
❖ *When an error occurs during installation, refer to Chapter 4, 'Preventive maintenance and troubleshooting'.*

To install new customer parameters:

1 Check that the CR 25.0 is not scanning an image plate.

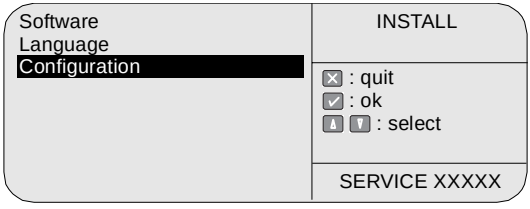
If the CR 25.0 is scanning an image plate, the status indicator at the top of the machine is green and flashing.

2 In the key-operator main menu, select 'Install' via the Up and Down keys and confirm.



The CR 25.0 will display the Install menu.

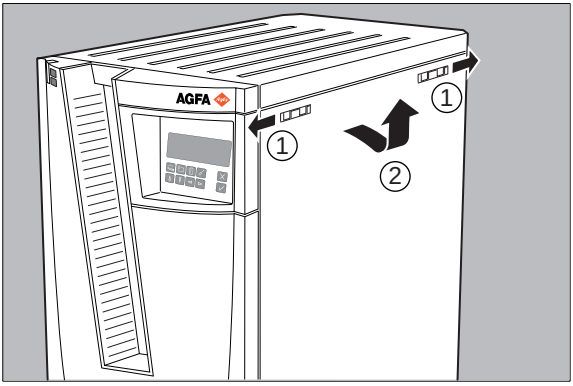
3 In the Install menu, select 'Configuration' via the Up and Down keys and confirm.



The CR 25.0 will display the Install configuration menu:

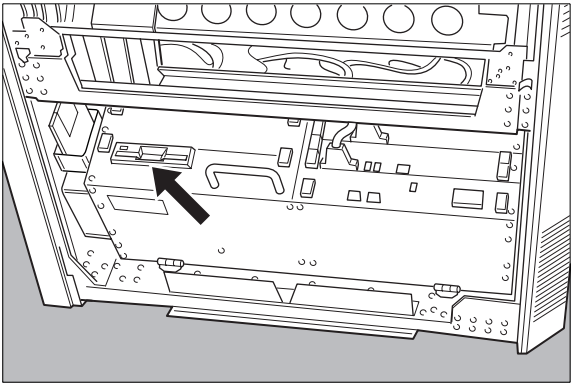
Please remove right side panel and insert the CPF- floppy in diskette drive and press ☑	INSTALL CONFIGU-RATION ☒ : quit ☑ : ok SERVICE XXXXX

4 Open the side panel by unlocking the two locks at the side of the machine.



5 Remove the side panel.

The disk drive is located at the bottom of the machine.



6 Insert the floppy with the new CPF-files in the disk drive and press the Confirm key.

The CR 25.0 will display:

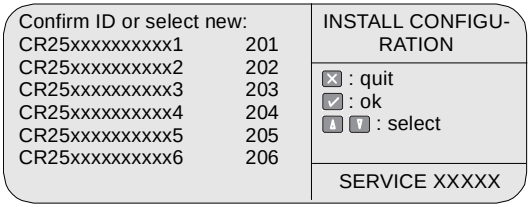
copying <file name> . . .	INSTALL CONFIGU-RATION ☒ : quit ☑ : ok SERVICE XXXXX

Please remove the floppy and press ☑	INSTALL CONFIGU-RATION ☒ : quit ☑ : ok SERVICE XXXXX

7 Remove the floppy from the disk drive and press the Confirm key.

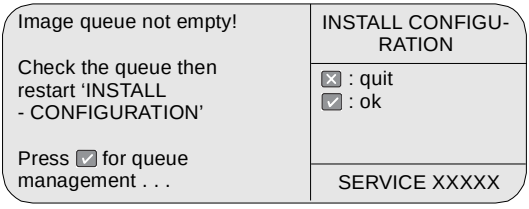
Parsing CPF file Please wait	INSTALL CONFIGU-RATION ☒ : quit ☑ : ok SERVICE XXXXX

8 Wait until the CR 25.0 displays:



This screen offers you the possibility to change the IP address of the CR 25.0.

❖ *If the CR 25.0 displays the screen below, the image queue is not empty, and therefore you cannot change the IP address of the CR 25.0.*



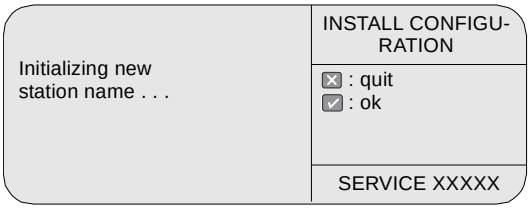
Press the Confirm key to consult the image transmission queue and if necessary delete the images in the queue. Refer to *'Consulting the images in the queue'* on page *56*. When the queue is empty, restart the 'Install - Configuration' function, refer to step **2**.

9 You have the choice whether or not to change the IP address:

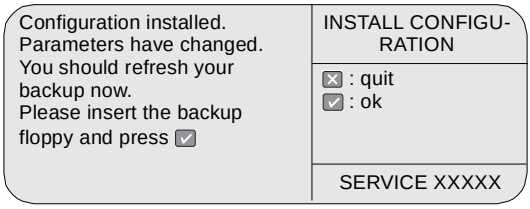
◆ To keep the current IP address, press the Confirm key.

◆ To change the IP address of the CR 25.0, select an IP address and the corresponding name via the Up and Down keys and confirm.

The CR 25.0 will display:



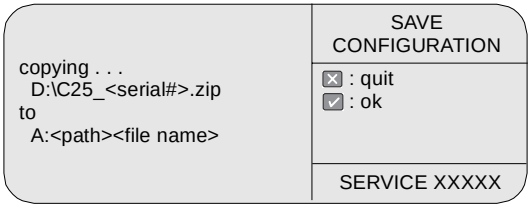
10 Wait until the CR 25.0 displays:



You must make backup files with the new parameters.

11 Insert an empty formatted floppy into the disk drive and press the Confirm key.

The CR 25.0 will start copying the machine specific configuration data while displaying the Save configuration screen:

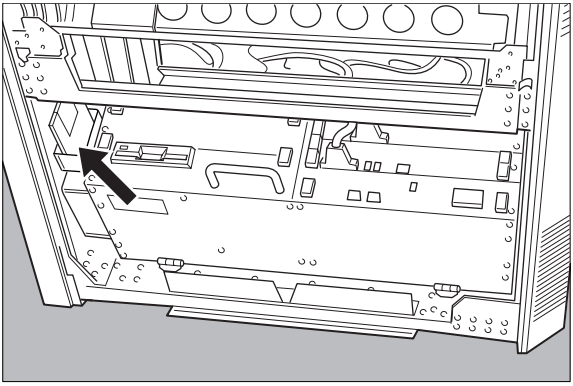


12 When the screen below is displayed, note down the serial number and the date.

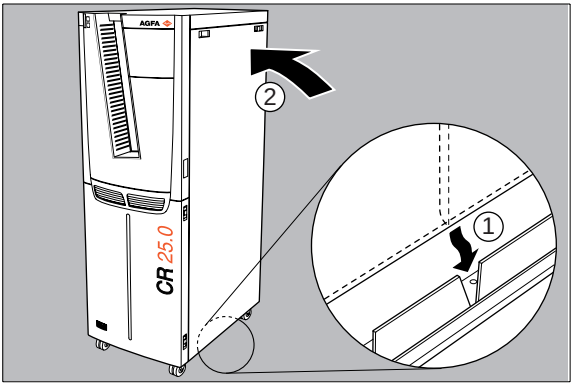
Machine configuration saved. Label the floppy: Backup CR 25.0 S/N: <serial#> Date: <date> Please remove the floppy and press ☑	SAVE CONFIGURA-TION ☒ : quit ☑ : ok SERVICE XXXXX

13 Remove the floppy from the disk drive and label it with the data from the screen.

14 Store the floppy with the CPF-files of the CR 25.0 and the backup floppy in the storage box at the bottom of the machine.



15 Reinstall the right side panel.



The CR 25.0 will restart automatically.

After start-up, the operator main screen will be displayed.

Saving the configuration data on a diskette (backup)

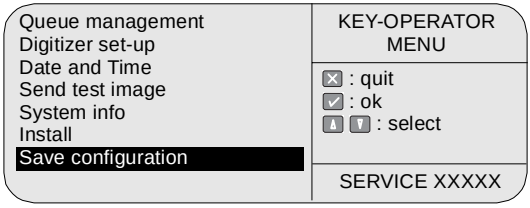
Via the Save configuration function in the key-operator main menu you can make backup files of the machine specific data.

To make a backup:

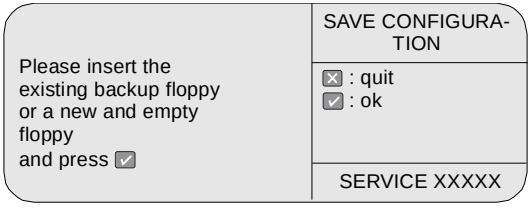
1 Check that the CR 25.0 is not scanning an image plate.

If the CR 25.0 is scanning an image plate, the status indicator at the top of the machine is green and flashing.

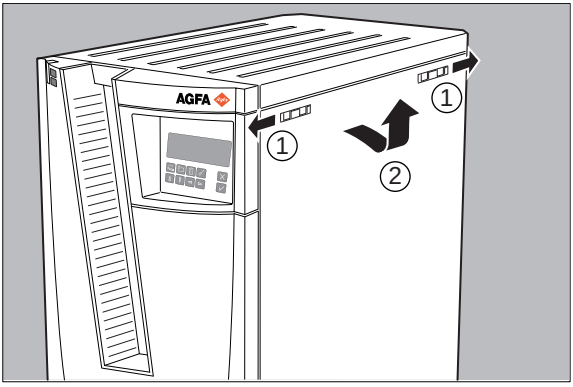
2 In the key-operator main menu, select ‘Save configuration’ via the Up and Down keys and confirm.



The CR 25.0 will display the Save configuration menu.

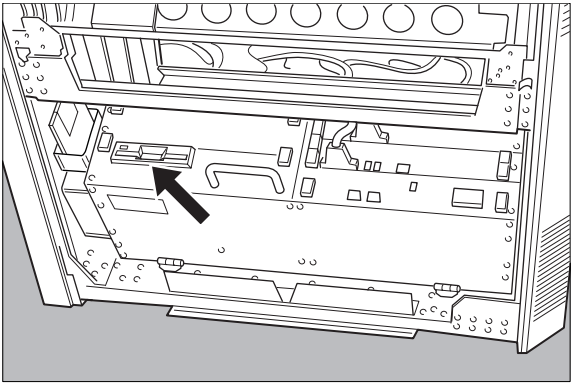


3 Open the side panel by unlocking the two locks at the side of the machine.



4 Remove the side panel.

The disk drive and the storage box for floppies are located at the bottom of the machine.



5 Insert the backup floppy onto which you want to store the configuration data and press the Confirm key.

The CR 25.0 will display:

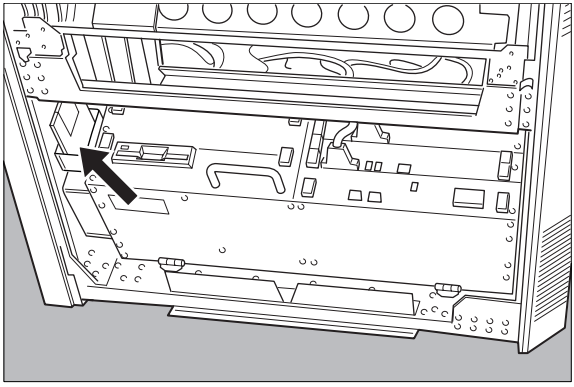
copying . . . D:\C25_<serial#>.zip to A:<path><file name>	SAVE CONFIGURATION ☒ : quit ☑ : ok SERVICE XXXXX

6 When the screen below is displayed, note down the serial number and the date.

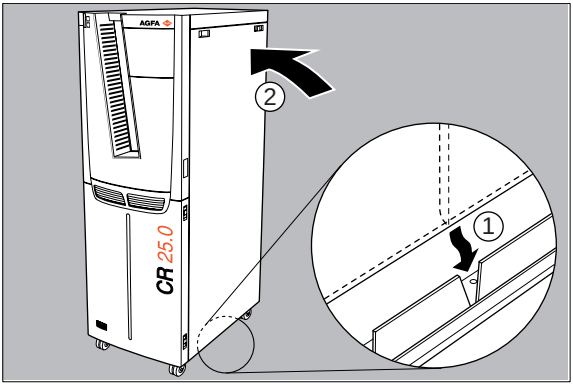
Machine configuration saved. Label the floppy: Backup CR 25.0 S/N: <serial#> Date: <date> Please remove the floppy and press ☑	SAVE CONFIGURATION ☒ : quit ☑ : ok SERVICE XXXXX

7 Remove the floppy from the disk drive and label it with the data from the screen.

8 Store the backup floppy in the storage box at the bottom of the machine.



9 Reinstall the right side panel.



The CR 25.0 will restart automatically.

After start-up, the operator main screen will be displayed.

Chapter 4

Preventive maintenance and troubleshooting

This chapter provides solutions to some problems you may encounter while working with the CR 25.0.

- ❑ Checking the image quality
- ❑ Troubleshooting checklist
- ❑ Replacing the erasure lamps
- ❑ Checking the voltage supply
- ❑ Solving image plate and cassette jams

Checking the image quality

The only maintenance action which you must perform is checking the image quality. Refer to the Reference manual of the image processing system.

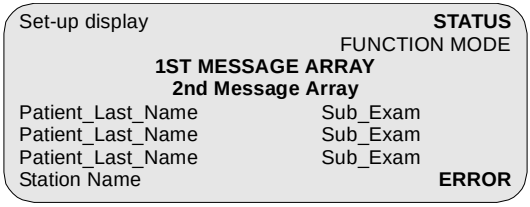
Troubleshooting checklist

A survey of possible problems is listed below. If corrective actions are straightforward, they are given below. The more elaborate troubleshooting procedures are explained in detail in the following sections.

General errors

Error	Action
The CR 25.0 does not start up.	Refer to *'Checking the voltage supply'* on page *101*.

Errors during operation



Status field:	**ERROR**
Error field:	'SERVICE XXXXX'
Contact your local service organization.	

Status field:	**ERROR**	
Error field:	'CODE XXXXX'	
MESSAGE 1	**Message 2**	**Action**
POWER SUPPLY OUT OF TOLERANCE	1. Check setting of voltage selector switch on back panel. 2. Check fuses of the machine 3. Check supply voltage.	Refer to *'Checking the voltage supply'* on page *101*.

Status field: Error field:	**ERROR** 'CODE XXXXX'	
IP JAM	1. Remove right side panel 2. Put plate back into cassette. 3. Close right side panel.	Refer to *'Solving image plate and cassette jams'* on page *104*.

Status field:	**WARNING**	
MESSAGE 1	**Message 2**	**Action**
ERASURE LAMP [X], [Y], [Z] DEFECTIVE	Press ☑ to complete, IP is not erased	• Press Confirm key. • Refer to *'Replacing the erasure lamps'* on page *96*.
SCANNER WARNING	Possible bad image, press ☑	• Press Confirm key. • Contact your local service organization.
[PPNAME] NOT READY	Please check and press ☑	• Check image processing station. • If image processing station is ready, press Confirm key.
CORRUPTED IMAGE IN QUEUE	Please press ☑ and check queue	• Press Confirm key. • Refer to *'Consulting the image transmission queue ('Queue management')'* on page *52*.
UNKNOWN DESTINATION [PPNAME]	Please press ☑ and check queue	• Press Confirm key. • Refer to *'Consulting the image transmission queue ('Queue management')'* on page *52*.
ERROR WHILE LOADING LANGUAGE FILE	Default language is used, please press ☑	• Press Confirm key. English will be used. • Restart CR 25.0. • If the problem persists, contact your local service organization.

Status field:	WARNING	
MESSAGE 1	**Message 2**	**Action**
PARTLY SCANNED IP DETECTED	Possible loss of image, press ☑	• Press Confirm key. • Check image at destination.

Status field:	LOCKED	
MESSAGE 1	**Message 2**	**Action**
IP NOT SUFFICIENTLY ERASED	Press ☑ and erase again	• Press Confirm key. • Refer to *'Re-erasing an image plate'* on page *42*.
EMPTY CASSETTE	Press ☑ to get cassette	• Press Confirm key. • Remove cassette. • Insert cassette containing image plate.
CASSETTE WRITE ERROR	Press ☑ to get cassette	• Press Confirm key. • Remove cassette. • Use another cassette. • If problem persists with other cassettes, contact your local service organization.
WRONG CASSETTE	Press ☑ and remove cassette.	• Press Confirm key. • Remove cassette. • Insert correct cassette in the right way.
CASSETTE IDENTIFICATION ERROR	Press ☑, remove and identify	• Press Confirm key. • Remove cassette. • Re-identify cassette. • Re-insert cassette.
CASSETTE READ/ WRITE ERROR	Press ☑, remove and try again	• Press Confirm key. • Remove cassette. • Re-insert cassette. • If problem persists, initialize and identify cassette via ID Station. • If problem persists with other cassettes, contact your local service organization.

Status field:	LOCKED	
MESSAGE 1	**Message 2**	**Action**
CASSETTE NOT IDENTIFIED	Press ☑, remove and identify	• Press Confirm key. • Remove cassette. • Identify cassette. • Re-insert cassette.
24 X 30 CM CALIBRATION MISSING	Press ☑ to accept or ☒	• Press Confirm key to treat 24 x 30 cm image plate without calibration or press Cancel key to treat cassettes with other formats. • Contact your local service organization.
SERVICE MODE	Please wait	Wait.
CASSETTE SLOT BLOCKED	Remove cassette, press ☑	• Remove cassette. • Remove obstructing objects. • Press Confirm key.
IMAGE-QUEUE FULL	Check queue	• Refer to *'Consulting the image transmission queue ('Queue management')'* on page *52*. • Check that the CR 25.0 is not off line (Refer to *'The display'* on page *19*).
UNKNOWN DESTINATION [PPNAME]	Press ☑, remove cassette and identify	• Press Confirm key. • Remove cassette. • Identify cassette. • Re-insert cassette. • Check the configuration of the system.
RIGHT SIDE PANEL NOT CLOSED	Close right side panel	Close the right side panel.
UNKNOWN IP-TYPE	Press ☑, remove cassette, call Service.	• Press Confirm key. • Remove cassette. • Contact your local service organization.

Status field:	LOCKED	
MESSAGE 1	**Message 2**	**Action**
EMERGENCY DATA NOT DEFINED	Emergency keys disabled, press ☑	• Press Confirm key • Contact your local service organization.

Errors when handling diskettes

Error	Action
Wrong or missing volume label	• Remove floppy. • Insert floppy with correct label. • Press Confirm key.
Floppy not formatted	• Remove floppy. • Insert formatted floppy. • Press Confirm key.
Floppy full	• Remove floppy. • Insert empty formatted floppy. • Press Confirm key.
Floppy write protected	• Remove floppy. • Remove write protection from floppy. • Re-insert floppy. • Press Confirm key.

Replacing the erasure lamps

If the CR 25.0 displays the warning message ‘ERASURE LAMP [X], [Y], [Z] DEFECTIVE’, proceed as follows:

1 Note down the numbers of the broken lamps.

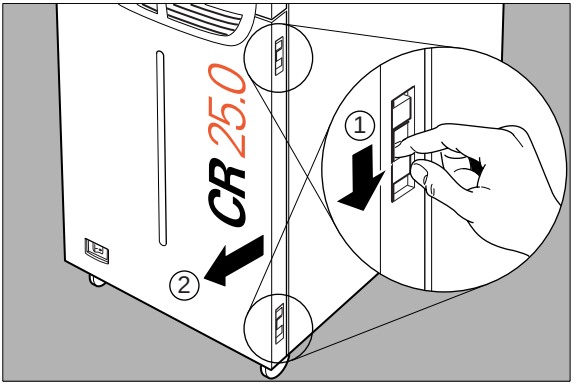
2 Check that the CR 25.0 is not scanning an image plate.

If the CR 25.0 is scanning an image plate, the status indicator at the top of the machine is green and flashing.

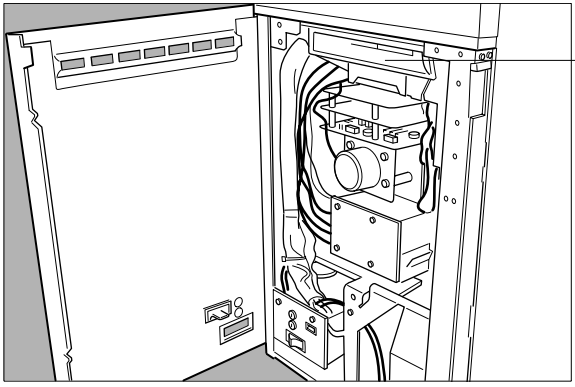
3 Switch off the CR 25.0 and disconnect it from the mains.

Disconnect the CR 25.0 from the mains before proceeding!

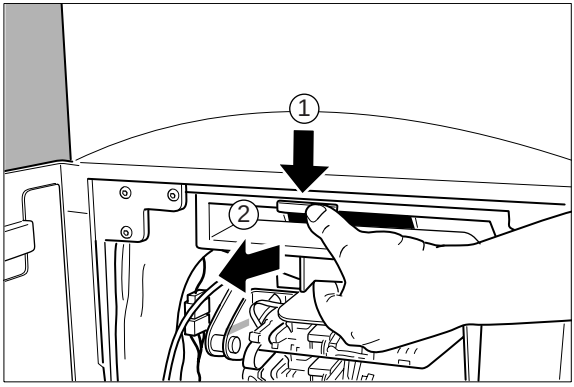
4 Open the lower front door by unlocking the two locks at the side of the machine.



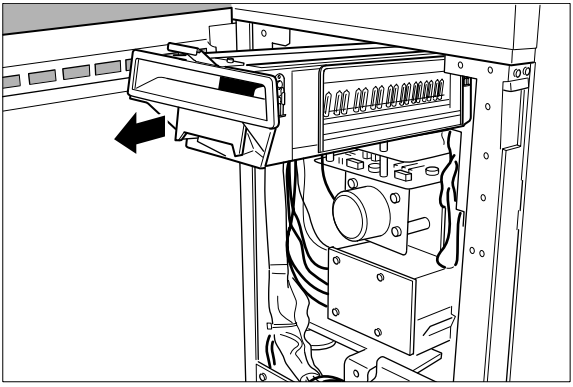
The erasure unit is located at the top of the lower machine part.



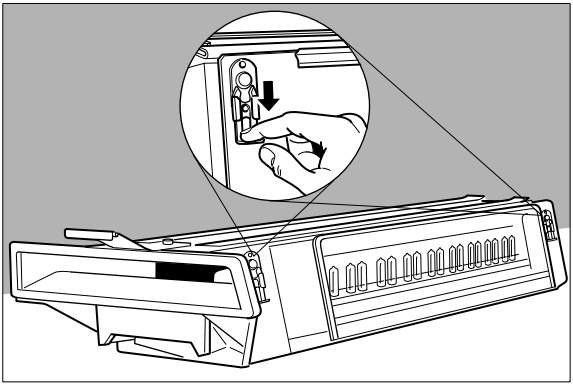
5 Push the spring-loaded lever down to unlock the erasure unit and draw out the erasure unit.



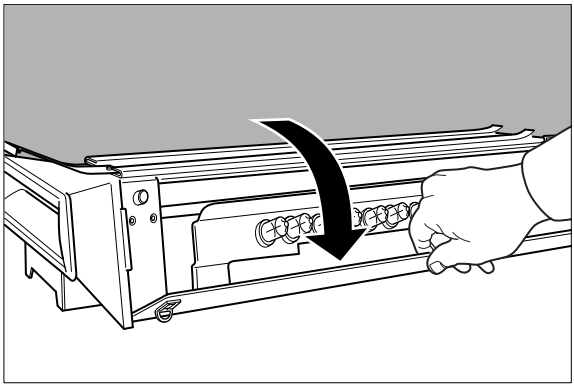
6 Slide out the erasure unit completely and place it on a stable surface.



7 Loosen the two clamps at both sides of the erasure unit by pressing the clips downwards.



8 Open the cover at the side of the erasure unit.

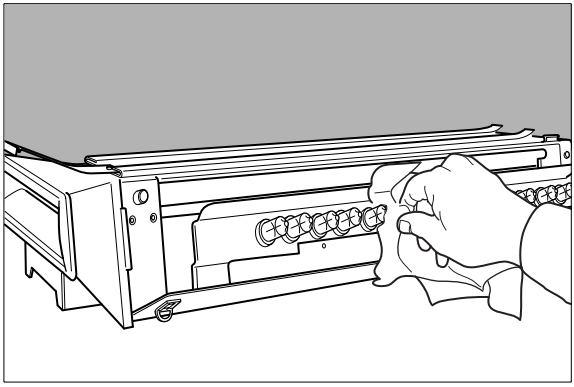


9 Locate the broken erasure lamps.

The erasure lamps are numbered from left to right.

The erasure lamps may be hot!

10 Remove the broken erasure lamps by pulling them out of the erasure unit.

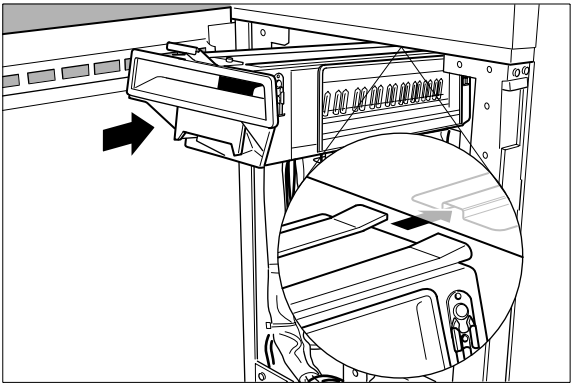


Do not touch the glass bulb of the new erasure lamps with your fingers. Use gloves or a clean cloth.

11 Insert the new erasure lamps.

❖ *If the erasure lamps have been used for more than 2 years, replace all erasure lamps.*

12 Re-insert the erasure unit. Make sure the unit grips onto the rail at the top of the machine casing.

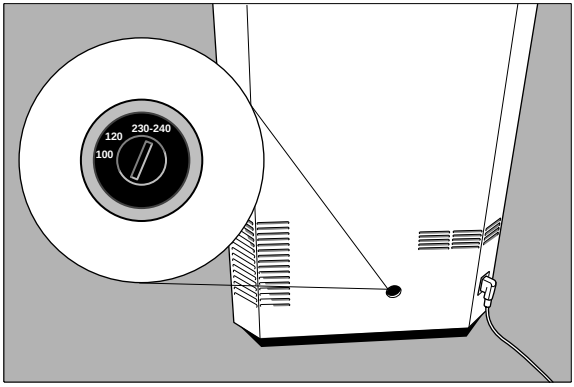


13 Push the lower front door of the CR 25.0 to close it.

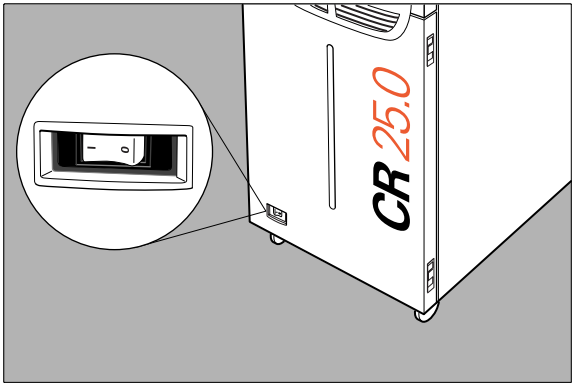
Checking the voltage supply

If the CR 25.0 does not start up or displays the message ‘POWER SUPPLY OUT OF TOLERANCE’ after it is switched on, proceed as follows:

1 Check that the setting of the voltage selector at the back of the machine matches the power supply voltage.



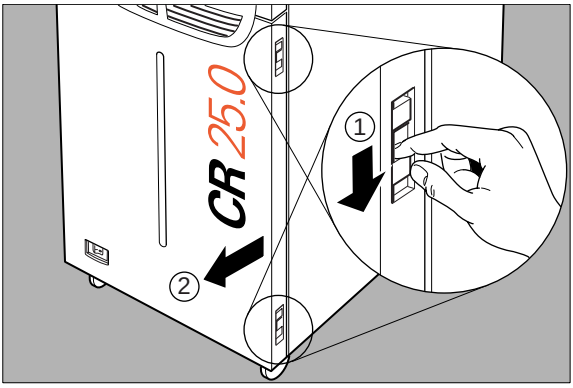
2 Check the main switch.



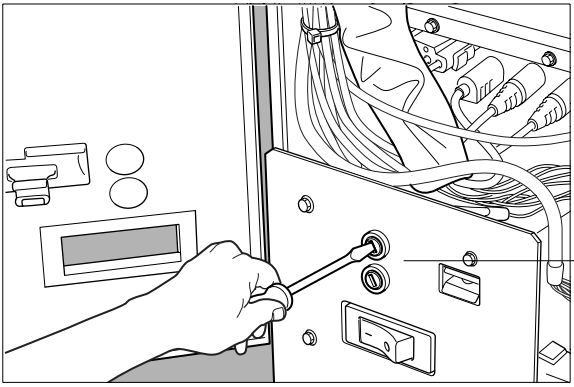
3 If this does not solve the problem, check the fuses:

Switch off the CR 25.0 and disconnect it from the mains!

4 Open the lower front door by unlocking the two locks at the side of the machine.

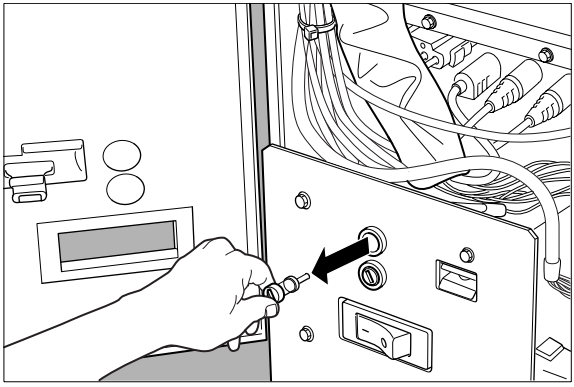


The fuses are located at the bottom of the machine.



5 Use a screwdriver to loosen the fuses.

6 Remove both fuses.



Replace the fuses only with fuses of the same type!

If the glass bulb of a fuse is clear, the fuse is still intact. Re-insert the fuse.

If the glass bulb of a fuse is black, the fuse has blown.

7 Replace the blown fuse(s) with new fuses of the same type.

8 Fasten the fuses with a screwdriver.

9 Push the lower front door of the CR 25.0 to close it.

10 Plug in the CR 25.0 and switch it on.

11 If the CR 25.0 does not start up or displays the message ‘POWER SUPPLY OUT OF TOLERANCE’ after it is switched on, check the mains.

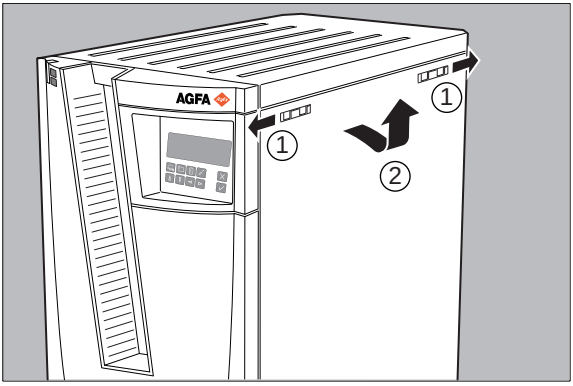
12 If the problem persists, contact your local service organization.

Solving image plate and cassette jams

If the CR 25.0 displays the warning message ‘IP JAM’, proceed as follows:

Switch off the CR 25.0 and disconnect it from the mains!

1 Open the side panel by unlocking the two locks at the side of the machine.



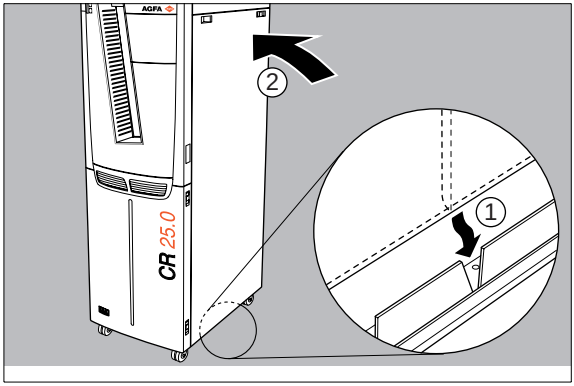
2 Remove the side panel of the CR 25.0.

3 Check the position of the image plate:

- If the image plate is still completely in the cassette, go to Section *‘The image plate is still completely in the cassette’* on page *105*.
- If the image plate is only partly in the cassette, go to Section *‘The image plate is only partly in the cassette’* on page *106*.
- If the image plate is not in the cassette, go to Section *‘The image plate is not in the cassette’* on page *108*.

The image plate is still completely in the cassette

Reinstall the right side panel.

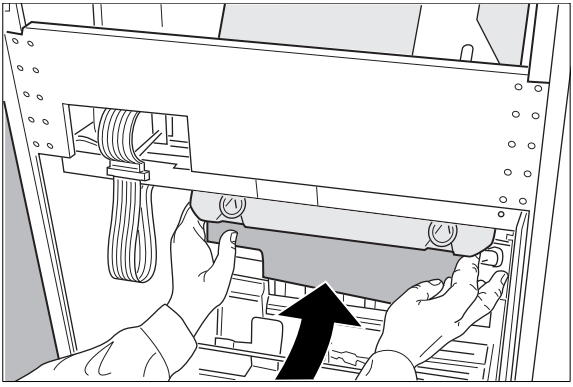


The CR 25.0 will restart automatically and return the cassette. If this is not the case, contact your local service organization.

The image plate is only partly in the cassette

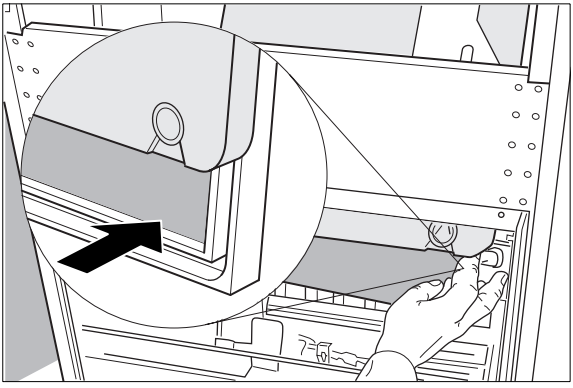
1 Try to slide the image plate completely into the cassette.

If you do not succeed in sliding the image plate back into the cassette, contact your local service organization.

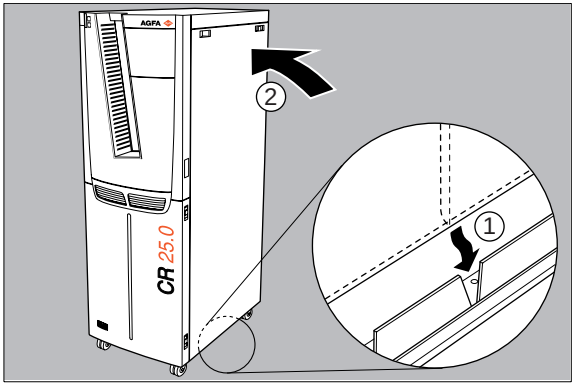


Do not close the cassette manually.

Take care to position the image plate within the inner edge of the cassette as illustrated below.



2 Reinstall the right side panel.



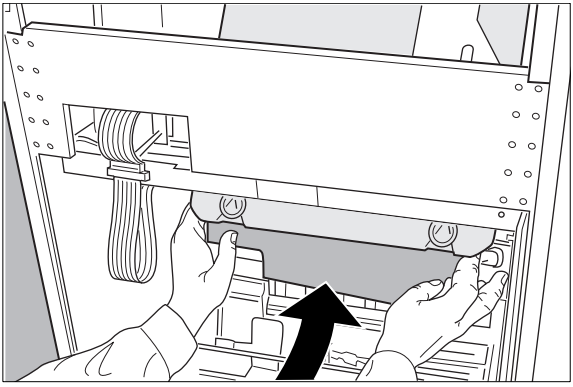
The CR 25.0 will restart automatically and return the cassette. If this is not the case, contact your local service organization.

The image plate is not in the cassette

1 Check the position of the image plate:

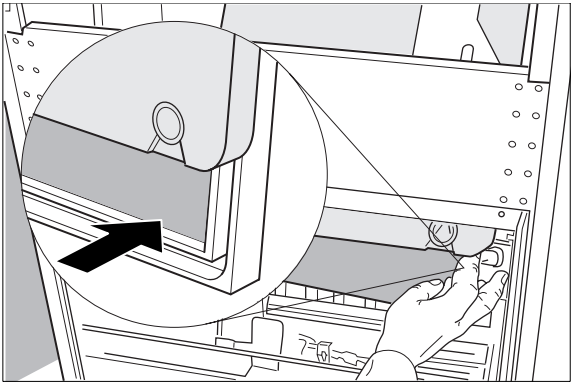
- If the image plate is located in the upper part or at the center of the CR 25.0, try to slide the image plate completely into the cassette.

  If you do not succeed in sliding the image plate back into the cassette, contact your local service organization.



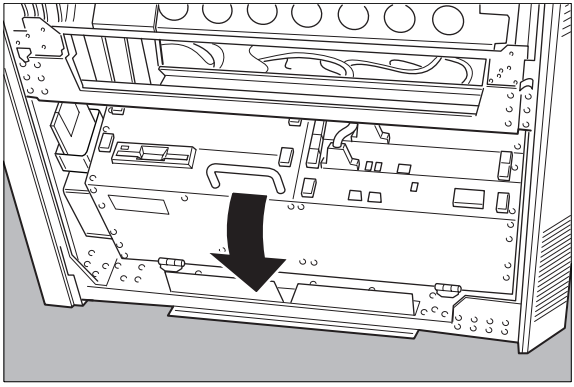
Do not close the cassette manually.

Take care to position the image plate within the inner edge of the cassette as illustrated below. Subsequently, proceed with step **4**.

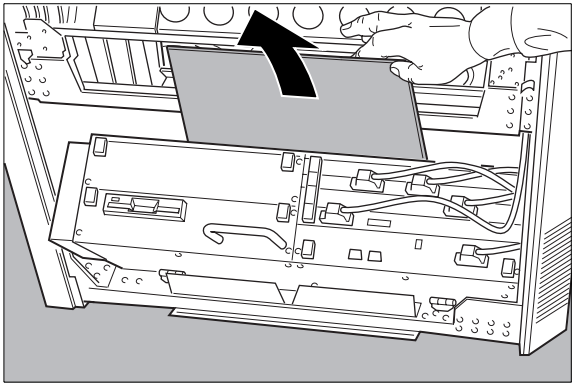


- If the image plate is located at the bottom of the CR 25.0, proceed with step **2**.

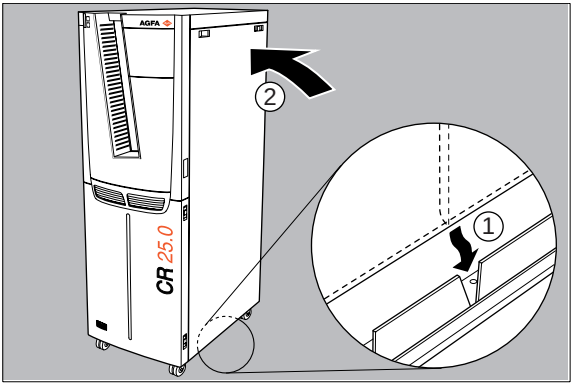
2 Tip the unit at the bottom of the machine towards you.



3 Remove the image plate very carefully.



4 Reinstall the right side panel.



The CR 25.0 will restart automatically and return the cassette. If this is not the case, contact your local service organization.

5 If you had to remove the image plate from the CR 25.0, inspect the image plate. If it is not damaged, insert it into the cassette.

Appendix A

Equipment information sheet

Specifications

Product description	
Type of product	Digitizer
Commercial name	CR 25.0
Model number	5156
Original seller/manufacturer	Agfa-Gevaert NV-Mortsel
Labelling	
CE	93/42 EEC ‘Medical Devices’ (Europe)
UL	UL 60601-1 and CSA 22.2 No. 601-1 (North America)
CUL	(North America)
Dimensions	
Length, at cassette slot	750 mm
Length, at foot	710 mm
Width	450 mm
Height	1408 mm
Weight	
Unpacked	277 kg
Electrical connection	
Operating voltage	• 230 V / 240 V ± 10% • 120 V ±10% • 100 V ± 10%
Mains fuse protection	Europe: 16 A, slow blow USA & Japan: 15 A, slow blow
Mains frequency	50/60 Hz

Power consumption	
Standby	
• 230 V/ 50 Hz configuration	230 W
• USA: 120 V/ 60 Hz configuration	216 W
• Japan: 100 V/ 60 Hz	220 W
During operation	
• 230 V/ 50 Hz configuration	max. 1610 W
• 120 V/ 60 Hz configuration (USA)	max. 1440 W
• 100 V/ 60 Hz (Japan)	max. 1500 W
Environmental requirements	
Room temperature	15 °C - 30 °C
Maximum temperature change	0.5 °C/min.
Relative humidity	15 % - 80 %
Magnetic field (Dynamic)	compliant with EN 61000-4-8, Level 5
Sunlight exposure	not be operated in full sunlight
Warming-up time	
• Cold start	fully operational after max. 30 min.
• Warm start	fully operational after self-test if not switched off for more than 3 min., after 30 min. operation
Cassette format	**corresponding IP format**
24 x 18 cm	238 x 178 mm
30 x 24 cm	298 x 238 mm
35 x 35 cm	354 x 354 mm
35 x 43 cm	354 x 430 mm
30 x 15 cm	298 x 148 mm
12 x 10”	303 x 252 mm
10 x 8”	252 x 201 mm

Physical emissions	
Noise emission (sound power level according to ISO 7779)	
• During scanning	max. 65 dB(A)
• Standby	max. 45 dB(A)
Radio frequency emission	according to EN 55022:1997, Class B and Radio frequency emission FCC, Part 15, Subchapter B, Class A
Heat emission	
• During scanning	max. 1610 W
• Standby	230 W
Cassette return time	51 - 95 s
End of Life	
Estimated product life (if regularly serviced and maintained according to Agfa instructions)	7 years

Appendix B

ADC Compact cassette

Safety precautions

Observe great care whenever removing the image plate from the ADC Compact cassette. Refer to the cleaning procedure described further on in this manual.

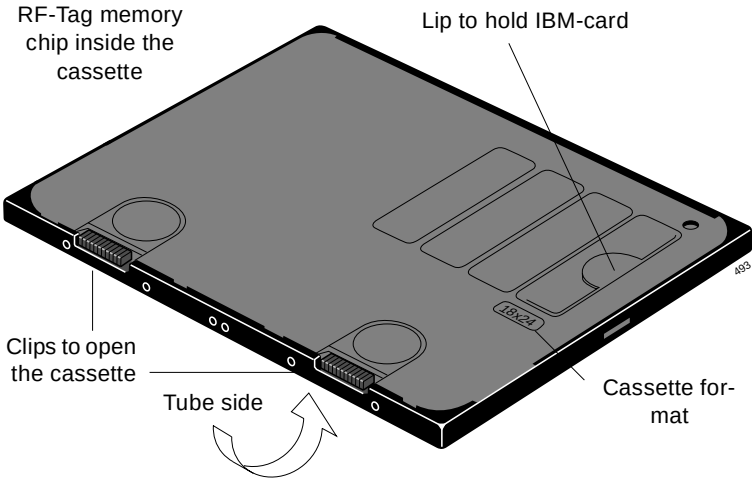
Make sure that the automatic exposure control device is placed above the cassette, to prevent patients from receiving an overdose of X-rays. When it is located underneath the cassette, the backscatter protection (lead) contained in the red side of the cassette, retains a certain amount of X-rays. The dose measured by the cell will then be much lower than the dose actually given to the patient.

❖ *The image plate causes a specific X-ray scattering. This influences the response of the exposure control device. To compensate for this, recalibration of the device for the use with ADC Compact cassettes could be necessary.*

Description of the ADC Compact cassette

The ADC Compact cassette and plate are compatible with existing X-ray tables. The exposure equipment and routines do not have to be modified when switching from conventional to digital imaging. Although compatible with existing X-ray equipment, an ADC Compact cassette is quite different from a conventional cassette. The most important difference lies inside, in the image receptor.

ADC Compact cassettes and ADC 70 cassettes are not interchangeable. But the same image plates can be used for both.



Embedded memory

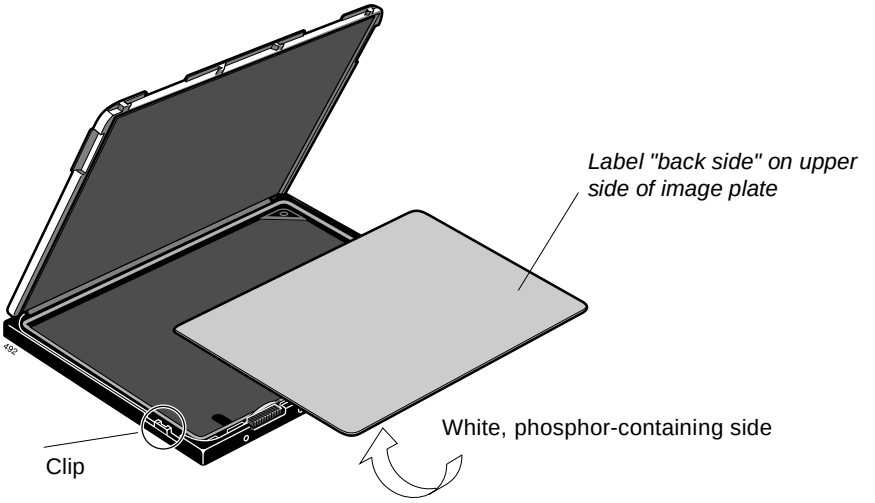
The main difference lies in the RF-tag memory chip that is permanently mounted in the cassette. Using the ADC ID Software you can enter patient demographics and examination data into the memory chip. The identification of this data is performed by no-touch radiofrequency tagging via a built-in antenna card in the ADC Compact cassette.

Image plate

Another difference between an ADC Compact cassette and a conventional cassette is the X-ray sensitive element (image receptor). The latter is no longer a film, but an image plate that can be re-used thousands of times.

The way in which this image plate is placed into the cassette is of great importance. The side containing the white phosphor must be oriented towards the black tube side of the cassette. The dark support side is then oriented towards the red side of the cassette, as shown in the illustration below.

The ‘clips’ mounted on the cassette prevent the cassette from being opened by a conventional daylight system such as the Curix Capacity (Plus), so that even in hybrid conventional/digital departments the occurrence of errors is avoided.



Cleaning the image plate

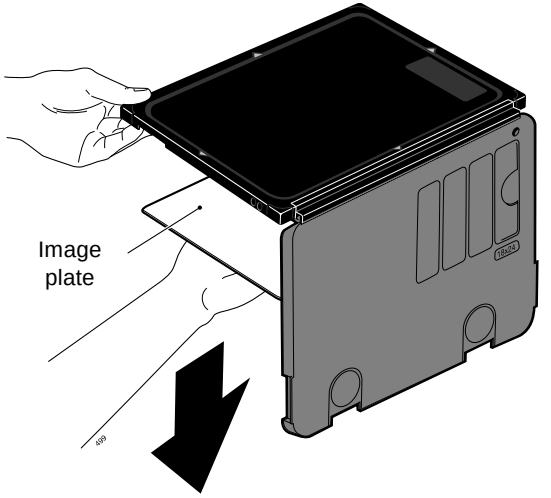
The inner lining of the ADC Compact cassette body is made of Bayer Makrolon polycarbonate. This ensures a high degree of protection against electrostatic charging and dust collection on the ADC image plates. Nonetheless, it is recommended to clean the image plates once a month using the following procedure:

1 Open the cassette with the red side up.

2 Put your hand on the image plate with the cassette in a horizontal position. Make sure that you do not press on the plate.

3 Turn the cassette over, holding the image plate in position with your other hand.

4 Take away the cassette. The image plate remains lying on your hand.



5 When necessary, clean extreme contamination with ADC Digital Screen Cleaner.

6 Moisten a cellulose cloth (non-fluffy) with the cleaning agent.

7 Rub the cleaner softly and evenly over the whole surface of the screen.

8 Leave the cassette with the clean screens open for approximately 10 minutes to enable the solvent to evaporate.

9 Reassemble the cassette.

Make sure that the white side of the image plate, containing the phosphor, is oriented towards the (black) tube side of the cassette.

> ***Ensure that the image plate is within the flange on the inside of the cassette. If you put the image plate into the cassette differently, e.g. if the image plate lies partly in between the hinge of the cassette, it can be irreparably damaged.***

Cleaning the cassettes

When necessary, you can clean the outside of the ADC cassettes with soft water and soap or a detergent solution, with ADC Digital Screen Cleaner or with benzine. The inside should always be cleaned with ADC Digital Screen Cleaner.

Never clean the cassette with ethyl alcohol, methyl alcohol or diethylic ether.

Technical specifications of the ADC Compact cassette

Sizes

- 35 x 43 cm (14 x 17")
- 35 x 35 cm (14 x 14")
- 24 x 30 cm
- 18 x 24 cm
- 8 x 10"
- 10 x 12"
- 21 x 43 cm (by partial scan of dedicated 35 x 43 cm cassettes)
- 35 x 43 cm HR high resolution cassette
- 35 x 35 cm HR high resolution cassette
- 15 x 30 cm dental cassette

Standards

- DIN 6832 part 1 & 2
- ANSI/NAPM IT 1.49-1995
- IEC 406 (draft 1995)

Weight

- 35 x 43 cm typical 1.6 kg

Material

- Body — ABS (Acrylonitryl Butadiene Styrene)
- Corners — Polyurethane Rubber (PUR)
- Hinge — Polypropylene (PP)
- Inner lining — Makrolon

Identification

- Memory chip (RF-tag card) embedded in the cassette

Backscatter protection

- 150 μ lead

Technical specifications of the image plate

Sizes

- 35 x 43 cm (14 x 17")
- 35 x 35 cm (14 x 14")
- 24 x 30 cm
- 18 x 24 cm
- 8 x 10"
- 10 x 12"
- 15 x 30 cm

Plate construction

Protective layer	Electron beam cured polymer
Phosphor	BaSrFBrI:Eu
Base	P.E.T.

Characteristics

Its luminescence spectrum is the typical Eu^{2+} -luminescence, which is at around 390 nm in lattices of the BaFBr-type. The top in the luminescence spectrum is shifted slightly to longer wavelengths due to the incorporation of iodide.

The stimulation spectrum is much broader than that of pure BaFBr and is shifted to longer wavelengths. This shift is caused in the first place by the partial replacement of Ba by Sr, and in the second place by the incorporation of iodide. Thanks to the red-shift of the stimulation spectrum, maximum stimulability is assured at 633 nm, the wavelength of the stimulating laser.

The Agfa phosphor has excellent dark decay characteristics. Two hours after exposure, approximately 80% of the energy stored upon exposure is still available. The image retention is greater than 50% up to 24 hours after irradiation.

Appendix C

Remarks for HF-emission and immunity

Remarks for HF-emission and immunity

This device is intended for operation in the electromagnetic environment given below. The user of the device should ensure that it is used in such an environment.

Transmission Measurements	Agreement	Electromagnetic Environment Guidelines
High frequency transmissions in accordance with CISPR 11	Group 1	The device uses high frequency energy exclusively for its internal functions. For this reason, its high frequency transmission is very low and it is improbable that neighboring electronic equipment will be disrupted.
High frequency transmissions in accordance with CISPR 11	Class B	The device is intended for use in all buildings, including living areas and areas directly connected to a public supply network that also supplies buildings that are used for domestic purposes.
Excess oscillations in accordance with IEC 61000-3-2	Class A	
Voltage fluctuations / flickering in accordance with IEC 61000-3-3	Fulfilled	

This device was tested for a normal hospital environment as described above. Nevertheless the HF-emission and immunity can be influenced by connected data cables depending on length and the manner of installation.

This device is intended for operation in the electromagnetic environment given below. The user of the device should ensure that it is used in such an environment.

Resistance to Jamming Test	IEC 60601 Test Level	Level of Agreement	Electromagnetic Environment Guidelines
Discharge of static electricity in accordance with IEC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should consist of wood, concrete or ceramic tiles. The relative humidity must be at least 30%, if the floor is made of synthetic material.
Fast transient electrical disturbance variables / bursts in accordance with IEC 61000-4-4	± 2 kV for network leads ± 1 kV for entry and outlet leads	± 2 kV for network leads ± 1 kV for entry and outlet leads	The quality of the voltage supplied should correspond to a typical commercial or clinical environment.
Impulse voltages (surges) in accordance with IEC 61000-4-5	± 1 kV push-pull voltage ± 2 kV common mode voltage	± 1 kV push-pull voltage ± 2 kV common mode voltage	The quality of the voltage supplied should correspond to that of a typical commercial or clinical environment.
Voltage breakthroughs, short term interruptions and variations in the voltage supplied in accordance with IEC 61000-4-11	• < 5% U_r (> 95% breakthrough of U_r) for ½ period • 40% U_r (> 60% breakthrough of U_r) for 5 periods • 70% U_r (30% breakthrough of U_r) for 25 periods • < 5% U_r (95% breakthrough of U_r) for 5 s	• < 5% U_r (> 95% breakthrough of U_r) for ½ period • 40% U_r (> 60% breakthrough of U_r) for 5 periods • 70% U_r (30% breakthrough of U_r) for 25 periods • < 5% U_r (95% breakthrough of U_r) for 5 s	The quality of the voltage supply should correspond to that of a typical commercial or clinical environment. If the user wants the device to work continuously, even when the energy supply is interrupted, it is recommended to use an energy supply free of interruptions or a battery.
Magnetic field at the supply frequency (50/60 Hz) in accordance with IEC 61000-4-8	3 A/m	3 A/m	Magnetic field at the network frequency should correspond to the typical values as they are in a commercial and clinical environment.
• REMARK : U_r is the alternating current in the network before the application of the test level.			

This device is intended for operation in the electromagnetic environment given below. The user of the device should ensure that it is used in such an environment.

Tests of Resistance to Disruption	IEC 60601 Test Level	Level of Agreement	Electromagnetic Environment
			Use portable and mobile radio sets at a safe distance from the device (including the leads) not closer than the recommended protective distance, which is calculated according to the equation suitable for the transmission frequency. Recommended protective distance:
Conducted high frequency disturbance variables in accordance with IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	3 V_{eff}	$d = 1.2 \sqrt{P}$
Radiated high frequency disturbance variables in accordance with IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = 1.2 \sqrt{P}$ 80 MHz to 800 MHz
			$d = 2.3 \sqrt{P}$ 800 MHz to 2.5 GHz
			With P as the rated power of the transmitter in watts (W) in accordance with the manufacturer information on the transmitter and d as the recommended protective distance in metres (m). The field strength of stationary radio transmitters is lower than the level of the agreement[a] at all frequencies in accordance with an on-site investigation[b]. Disruptions are possible near devices that carry the following symbol: 

- REMARK 1: The higher value will apply at 80 MHz and 800 MHz.
- REMARK 2: These Guidelines may not apply to all situations. The dispersion of electromagnetic waves is influenced by absorption and reflections from buildings, objects and people.

a. The field strength of stationary transmitters, such as base stations of radio telephones, mobile broadcasts for rural areas, amateur stations, and AM and FM radio transmitters, cannot be precisely predetermined theoretically. An investigation of the location is recommended, to ascertain the electromagnetic environment as a result of stationary high frequency transmitters. If the field strength of the device exceeds the level of agreement given above, the device must be observed with regard to its normal operation at each place of use. In case of unusual performance characteristics, it can be necessary to take additional measures, such as the re-orientation of the device, for example.
b. The field strength will be lower than 3 V/m above the frequency range from 150 kHz to 80 MHz.

This device is intended for operation in an electromagnetic environment in which the radiated high frequency disturbance variables are monitored. The user of the device can help to prevent electromagnetic disruptions by maintaining the minimum distances between portable and mobile high frequency communication equipment (transmitters) and the device as recommended below, in accordance with the maximum output power of the communications equipment.

Recommended Protective Distances between Portable and Mobile High Frequency Communication Equipment and the Device			
Rated Power of the Transmitter W	Protective Distance in accordance with Transmission Frequency m		
	150 kHz to 80 MHz $d = 1.2 \sqrt{P}$	80 MHz to 800 MHz $d = 1.2 \sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3 \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

The distance can be determined through the equation for each respective column.
P is the rated power of the transmitter in watts (W) according to the manufacturer information on the transmitter, only for transmitters where the rated power is not mentioned in the above table.

- REMARK 1 : An additional factor of 10/3 has been used to calculate the recommended protective distance of transmitters in the frequency range from 80 MHz to 2.5 GHz, to reduce the probability that mobile portable communication equipment unintentionally brought into the area of the patients will lead to a disruption.
- REMARK 2 : These Guidelines may not be relevant in all situations. The dispersion of electromagnetic waves is influenced by absorption and reflections from buildings, objects and people.

Appendix D

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